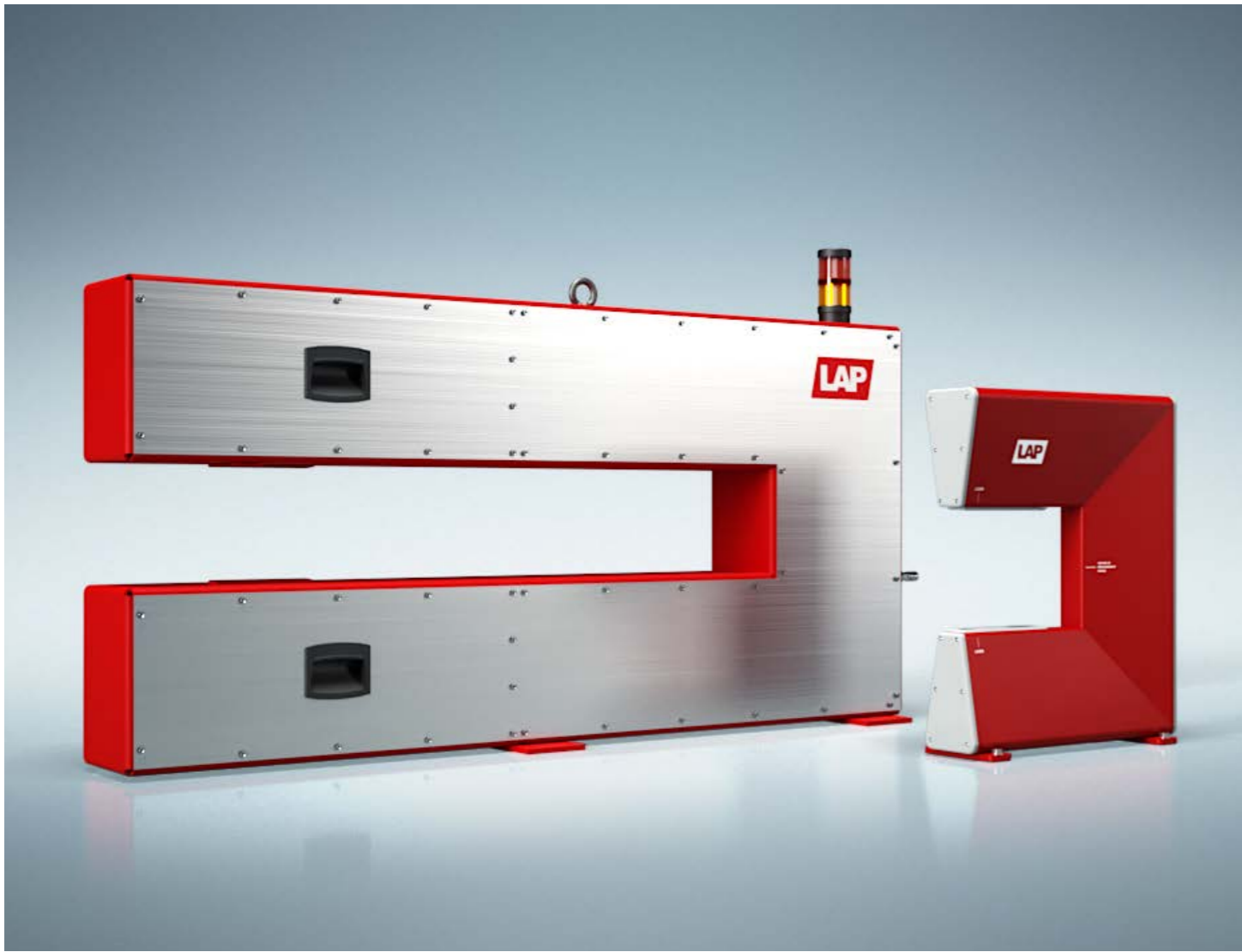


THICKNESS CHECK

NON-CONTACT THICKNESS MEASUREMENT
OF FLAT PRODUCTS



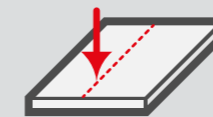


CALIX – NON-CONTACT INLINE THICKNESS MEASUREMENT

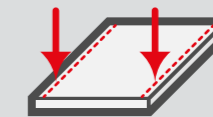
The CALIX series is a non-contact measuring system, particularly designed to assure process and quality control of flat products. Our thickness measuring systems replace complicated adjustments from distance sensors and measuring frame. CALIX systems are easy to install and to operate – each unit is calibrated and linearized during factory certification.

The LAP CALIX is offered in different sizes and depths according to the respective requirements of the industry. In addition, a traversing solution to move the CALIX on fixed rails and thus measure the complete profile of the products is available as an option. Independent of depths, CALIX systems provide precise measurements on almost all materials.

MEASURING RANGE



CENTER THICKNESS



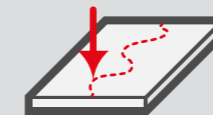
EDGE THICKNESS



CROSS PROFILE



LONGITUDINAL PROFILE



TRAVERSING
MEASUREMENT

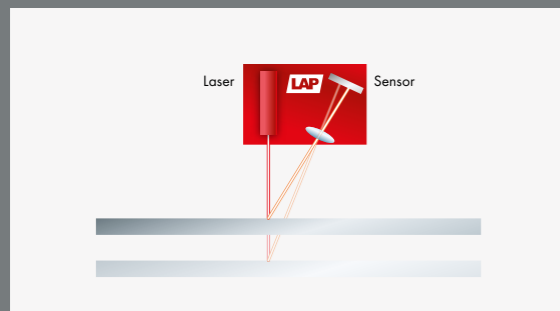


PROCESS OPTIMIZATION AND QUALITY ASSURANCE

Our mission is to simplify quality control for your production and to optimize the production process itself. The LAP CALIX is specifically designed for the non-contact inline measurement of flat products and replaces radiometric methods, thus no emissions regulations of any kind have to be complied with. Simultaneously, the quick and precise functioning of the measuring system allows higher productivity due to maximum production speed. Exact values, the highest possible accuracy despite the environment, as well as the easy handling are the distinguishing characteristics of the LAP CALIX.

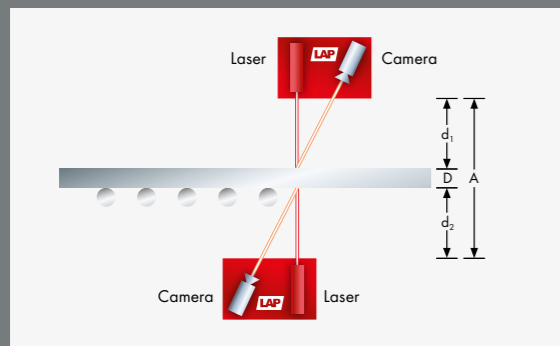
- Process monitoring in real time
- Checks dimensions and displays trends
- Detection of dimensional defects
- Rapid system feedback results in less scrap
- Increased profit through narrower thickness tolerances

MEASUREMENT PRINCIPLE



FUNCTIONALITY: LASER TRIANGULATION

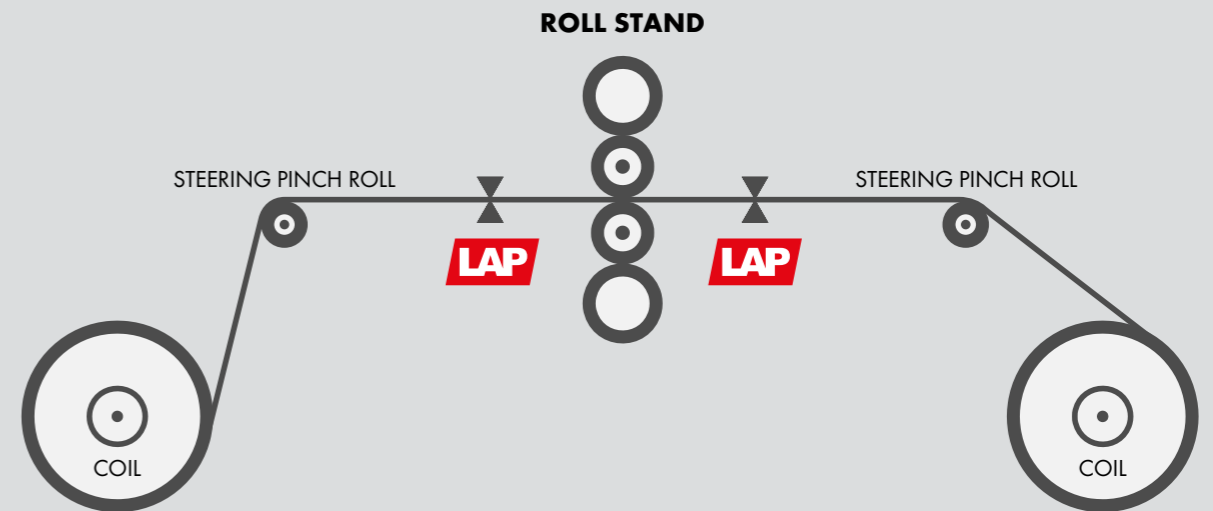
A laser beam emitted from the sensor creates a visible spot on the surface of the measured object. The camera detects this reflected spot in a distance-based angle. Using this angle and the known distance of laser and camera, the Digital Signal Processor computes the distance between the sensor and the measured object.



APPLICATION: MEASUREMENT BY DIFFERENCE METHOD

The thickness (D) is calculated by subtracting the measured distances from both sensors to the sheet from the total distance of sensors.

CLOSED-LOOP CONTROL OF ROLLER STANDS





TECHNICAL DATA

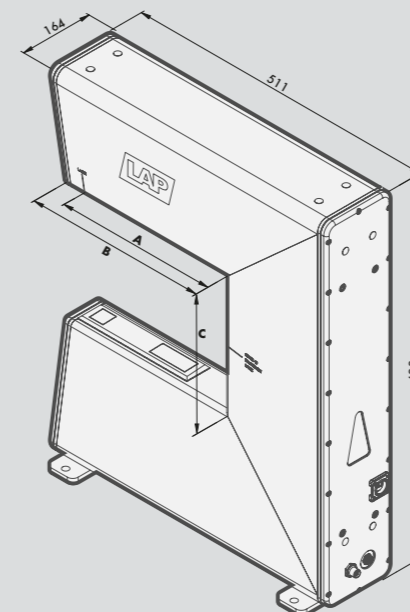
Measuring range [mm]	30
Accuracy (trueness) [μm]	$\pm 2,5$
Repeatability (precision) [μm]	0,35
Resolution [μm]	0,5
Throat depth / height [mm]	297 / 201
Measuring depth [mm]	256
Passline height [mm]	316
Frame dimensions (WxHxD) [mm]	140 × 623 × 514
Frame weight [kg]	20
Laser type	red diode
Available laser classes	2, 3B
Max. measuring frequency [kHz]	4
Max. material temperature [$^{\circ}\text{C}$]	200
Calibration unit (manual and automatic)	yes
Comprehensive software	yes
Data interfaces	RS485, Ethernet (TCP/IP, UDP, OPC UA, iba)
Positioning system	yes
Air purge system incl. protection housing and blower	yes
Cooling unit	yes
Control panel	yes
Windows PC-Set	yes

CALIX S EASY TO INSTALL, CONNECT, MEASURE





The LAP CALIX S with its compact measuring frame is especially suitable for edge measurements on the production line and for small strip. The measured data is a permanent control, which enables process optimization and fully documented quality. The measured values are output in a digital form. The lasers are precisely aligned under factory controlled conditions, avoiding complicated adjustments of the laser sensors and the related possible errors. Due to its space-saving design as well as fast calibration, the LAP CALIX S is an ideal complement to all cold strip processing lines.

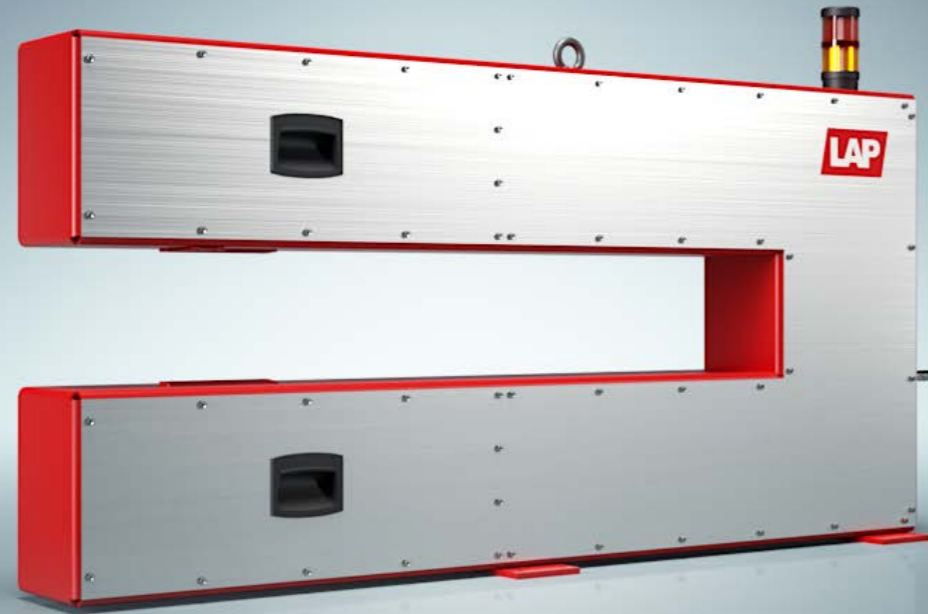
- Easy calibration
- Highest precision
- Quick measurement (up to 4 kHz)
- Ethernet data interface

LAYOUT



BENEFITS

-  **COST-EFFECTIVE**
-  **EASY HANDLING**
-  **IDEAL FOR EDGE MEASUREMENTS**
-  **SMALL, COMPACT FRAME**



TECHNICAL DATA

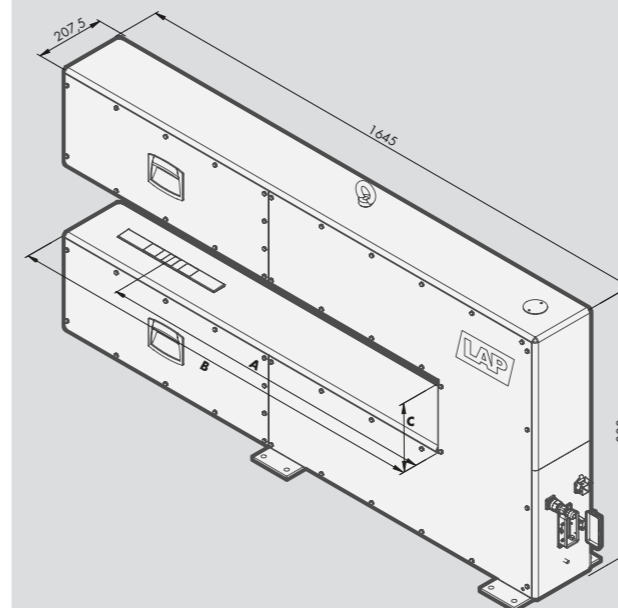
Measuring range [mm]	30
Accuracy (trueness) [μm]	$\pm 2,0$
Repeatability (precision) [μm]	0,35
Resolution [μm]	0,5
Throat depth / height [mm]	1300 / 200
Measuring depth [mm]	1090
Passline height [mm]	390
Frame dimensions (WxHxD) [mm]	207 x 800 x 1645
Frame weight [kg]	220
Laser type	red diode
Available laser classes	2, 3B
Max. measuring frequency [kHz]	4
Max. material temperature [$^{\circ}\text{C}$]	200
Calibration unit (manual and automatic)	yes
Comprehensive software	yes
Data interfaces	RS485, Ethernet (TCP/IP, UDP, OPC UA, iba)
Frame protection with light barrier	yes
Positioning system	yes
Air purge system incl. blower	yes
Cooling unit	yes
Control panel	yes
Windows PC-Set	yes

CALIX XL THE LONG RANGE SPECIALIST

For measurements in the centerline of the material or over the entire material width, the LAP CALIX XL offers the right solution with its traversing thickness measurement. LAP designs and manufactures the appropriate traversing rails for your application, fully automatic or manually operable to move the sensor out of the production line as needed and to return it later to the measuring position. The measuring depth of more than 1 meter allows for enough movement in most applications, that may be realized without a stationary, massive O-frame. Regardless of the composition of the material, you get accurate measurement results at a measuring frequency of up to 4 kHz.

- Two-angle triangulation on request
- Highest precision
- Quick measurement (up to 4 kHz)

LAYOUT



BENEFITS

-  **LARGE MEASURING DEPTH**
-  **INDIVIDUAL SOLUTIONS WITH TRAVERSING MEASUREMENT**
-  **HIGH PRECISION REGARDLESS OF THE MATERIAL**
-  **QUALITY ASSURANCE WITH MEASUREMENT HISTORY**

CONFIGURATION

Depending on the task and width of the material, there are several ways to use CALIX:

- single track measurement:
CALIX S width up to 500 mm
CALIX XL width up to 2000 mm
- one sensor traversing measurement:
CALIX S width up to 250 mm
CALIX XL width up to 1000 mm
- two sensors traversing measurement:
CALIX S width up to 500 mm
CALIX XL width up to 2000 mm
- multi-track measurement, e.g. using three sensors:
width 1400 mm:
2 × CALIX S, tracks with up to 250 mm distance to edge
1 × CALIX XL for center track



GUIDANCE RAILS

LAP offers rails for the CALIX which are customized for your application. You may move CALIX:

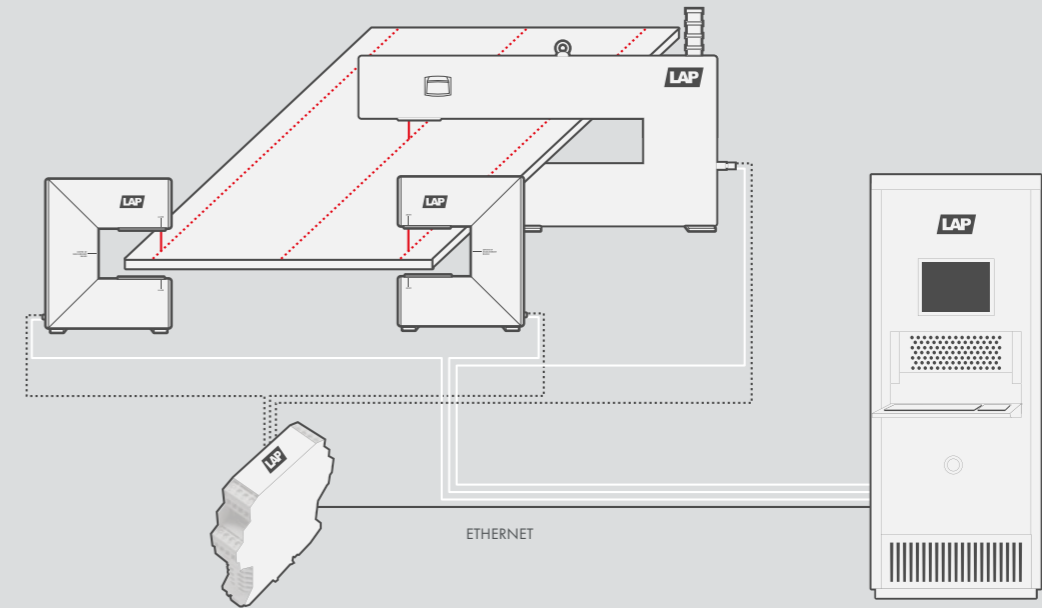
- manually and lock them in place at a measuring or a maintenance position
- automated to programmed positions
- by drive mechanism and lock them in different positions
- according to measurement programs for traversing or multi-track measurement.

SERVICE

MAINTENANCE – INSPECTION – REPAIRS SOFTWARE ENHANCEMENT

LAP stays right by your side before, during and after the installation of a LAP system. International experience acquired over decades in the installation and maintenance of laser systems across virtually all industries makes us a reliable and competent partner. For detailed information you can download our service brochure.

SYSTEM CONFIGURATION



Example of a 3-track measuring arrangement

REFERENCES

With our systems and services specifically tailored to the needs of the industry, we significantly support the day-to-day business of many big players in the steel market. Our goal is to create added value for our customers. Establishing a reliable connection and developing a successful partnership are our top priorities. Here is a selection of our worldwide projects:

NETHERLANDS

Using the CALIX XL for the measurement in a pickling line with a thickness of 0.125–8.0 mm and a width from 600–1910 mm. The speed of the line is up to 300 m/min.

CHINA

Non-contact measurement in a cold rolling mill. One CALIX XL set in front of the roller for the thickness measurement of 1.0–4.0 mm and another CALIX XL set after the roller for the thickness measurement of 0.7–3.0 mm. The speed is 180 m/min.

USA

A CALIX XL is used in a pickling line to check the sheet thickness in the range of 2–9 mm. The width of the material is 1350 mm. The material temperature is a maximum of 60 °C.

TAIWAN

Thickness measurement with 4 CALIX S on a line in the range of 1.0–8.0 mm and a width of 520–660 mm. Another 4 CALIX were installed in 2016.

SPAIN

4 CALIX S integrated to a battery plate with the thickness of 1.4–1.8 mm. During the ongoing production process 700 pieces per minute will be transported on tape.

GERMANY

Strip thickness measurement with two CALIX XL in one lane over half the bandwidth continuously traversing. These are fastened at each side of the roller table on an electric moveable adjustment unit. The thickness to be determined is in the range of 0.4–4.0 mm.

THICKNESS CHECK, HIGH-TECH QUALITY BY LAP

For more than 35 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.

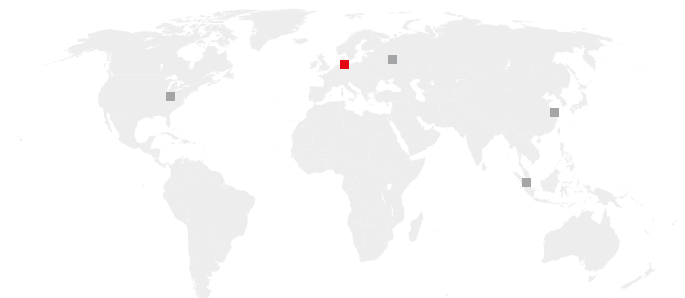
As a result of continuous product innovation, LAP has become a world leader in lasers for projection and measurement. LAP products are setting the standards in a wide range of markets from manufacturing to heavy industrial environments and medical applications. Environmental protection is important to us. We use solar panels, green electricity and roofs planted with grass. 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/CALIX



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LAP GmbH
Laser Applikationen
Zeppelinstrasse 23
21337 Lueneburg
Germany
Phone +49 4131 9511-95
Fax +49 4131 9511-96
Email info@lap-laser.com

LAP Laser, LLC
1830 Airport Exchange Blvd.
Suite 110
Erlanger, KY 41018
USA
Phone +1 859 283-5222
Fax +1 859 283-5223
Email info-us@lap-laser.com

LAP GmbH
Laser Applikationen
Представительство в Москве
1, Казачий переулок 7
119017 Москва
Российская Федерация
Тел. +7 495 7304043
Факс +7 495 7304044
Email info-russia.gi@lap-laser.com

LAP Laser Applications
Asia Pacific Pte. Ltd.
750A Chai Chee Road
#07-07 Viva Business Park
Singapore 469001
Phone +65 6536 9990
Fax +65 6533 6697
Email info-asia.gi@lap-laser.com

LAP Laser Applications
China Co. Ltd.
East Unit, 4F Building # 10
LujiaZui Software Park
No. 61 Lane 91 EShan Road
Shanghai 200127
China
Phone +86 21 5047-8881
Fax +86 21 5047-8887
Email info-cn@lap-laser.com

