



TECHNICAL DATA SHEET

SK1LP-ProDirector6-3D-G-05GN-1H

Laser projection system ProDirector 6, 5mW green

► DESCRIPTION

SL-Laser's computer-controlled projectors are industry proven to be rugged and durable, even when placed in hostile climates. Exacting quality control standards ensure the SL projector keeps projecting your profits, even on high-precision ultra accurate 3D production forms & molds, ensuring efficient production.

SL-Laser customizes each installation for your particular needs and production process. This allows elimination of errors, waste is reduced, parts are consistently accurate and quality is assured.

With thousands of projectors successfully installed worldwide in various industries, SL-Laser systems have even become standard equipment included by some of the world's finest original equipment manufacturers (OEM's).

SL-Laser is a proven supplier of the European aerospace industry, along with race cars, speedboats and other high-tech market sectors. Exacting representation of 3D outlines in the production area of composite work pieces also opens limitless boundaries.

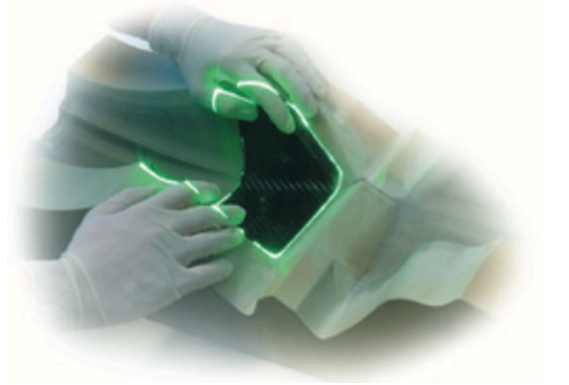
► PRODUCT OVERVIEW

LASER PROJECTOR ProDirector 6 is mainly a stationary mounted in a certain place, usually to the ceiling or an auxiliary structure, cross member, truss or cantilever beam.



Projection takes place from the fixed installation point to a surface, this can be a tool by laying layers of a composite material on a welding table on which components must be positioned, freeforms on CNC machines. In the timber frame construction on a table, there will be displayed different slats, glue beams, the projection of the contour, positioning of the blocks, as well as in the field of precast plants in the concrete by the different recesses, reinforcements, magnetic lines and other components are displayed.

This laser projector is available with green or red laser light. Green laser light is easier to see and more commonly used by industry. The laser projector is robust and hermetically sealed and thus protected against dust and dirt. The ProDirector 6 can illuminate a larger area as a single device or in conjunction with other laser systems.



3D laser projection facilitates the positioning of preregs



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The **Laser Projector** generates its image from common CAD design and construction drawings. The laser projector emits the desired outlines precisely into the production tooling or surface. The sequence of the images for the necessary steps of work procedure can be controlled and retrieved via a remote unit.

The laser projection color of the laser is red or green. A single laser dot is moved at a high rate of speed in both X and Y directions - moving so fast that a standing image is perceived by the human eye. The equipment can project at an infinitely variable angle from any direction, allowing the laser projector to be flexibly retrofit into an existing production process without positioning restrictions.

The **ProDirector 6** brings many advantages to the precast concrete component industry. Rails, shutters, form liners, accessory boxes, and architectural masonry are easily positioned with the laser light without measuring tapes.

The laser system can be installed in fixed locations and project onto moveable pallets or as a mobile trolley to move along rails above multiple setup zones.

► TYPICAL APPLICATIONS of ProDirector 6

- Composite
- Aerospace/Boatbuilding
- Woodworking
- Prefabricated Components
- Concrete/Brick-Laying
- Metal industry
- Stone and Marble
- Textile industry

► ProDirector 6 SYSTEM SPECIFICATIONS:

Position Accuracy	± 0.014"(0.35mm) at a distance of 15'over 17'x 17' (4.5m x 4.5m) area (equals to a 60° projection)
Field of View (FOV)	
Horizontal:	max. 80° (60° recommended)
Vertical:	max. 70° (60° recommended)
Laser:	5 mW maximum power, 0.9 mW "eye safe"-mode
Red:	625 - 640 nm laser diode,
Green:	532 nm diode-pumped solid state laser
Laser Class	
North America:	Class IIIa per 21CFR 1040 (CDRH)
International:	Class 2M per IEC/EN 60825-1:2007, CE certification
Power Requirement	80-240 VAC 50/60 Hz



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Dimensions

Length:	480 mm/18.90 "
Width:	170 mm /6.69 "
Height:	290 mm/11.42 "
Weight:	13,5 kg/29.76 lbs

The following accessories are included in the system:

Description	Image
Power cable, 220 V, length 25m	
Data cable, length 25m	
Cardanic bracket Holding flange with variable adjustment in all 3 room axes	
Converter USB RS485 V2 or optional Converter extern RS232C-RS485	

► SYSTEM UPGRADE

It is possible to upgrade the existing ProDirector 6 into **ProDirector 6+ Laser projection system**. Realization of this option needs to send your existing ProDirector 6 heads to Germany.



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The advantages of the updated Laser projection system:

- Much less flickering, the picture is stabilized with incredible speed
- **The ProDirector 6+** with a new operating system makes work much easier
- Latest driver technology makes the laser projection system much faster and more accurate
- Moving of the laser images much more fluent and less flickering regarding other systems. Much more images projected at once without flickering

The points on the reference image (rectangle picture 3000mm to 1000mm at a vertical distance of 3000mm) were generated by a new laser at a rate of 75 Hz. The predecessor model of the laser produces the same image only at 38 Hz. Thus, the new Laser ProDirector 6 + produces the image almost 50% faster * than the previous model.

*Attention! This statement only refers to the reference image under the same projection conditions! Depending on the application, data, working environment and customer requirements, the speed could vary.

► ProDirector 6 HARDWARE

- Temperature stabilized (peltier-cooled) 5mW solid state laser, projection colour green
- Precision-high speed scanner with push-pull amplifiers
- Electronics in modern SMD technology
- **Integrated embedded PC** with 400 MHz and 64 MB-memory **SK1LP-PC-STD**
- Optimized receiving sensor of the reflection radiation
- Input signal RS232, RS485
- Control indicators for power supply and reflection signal
- System filter in the current feed
- Over voltage protection at the supply entry
- Switch power supply unit with an input voltage of 80-240 VAC
- Industrial aluminium housing according to IP 54 with optimized surface for heat emission
- Environmental temperature 5-45 degrees Celsius
- CE-conformity-marking, Laser class 2M
- Manual and CD-ROM

► SL3D SL-SOFTWARE - SK1LP-SOFT-SL-3D

Short Description:

- Electronic ply book (Time stamp, ply name, Operator)
- Modify Ply data (Hide or Delete lines, reduce points)
- Data input (From CAD Systems such as CATIA, ProE)

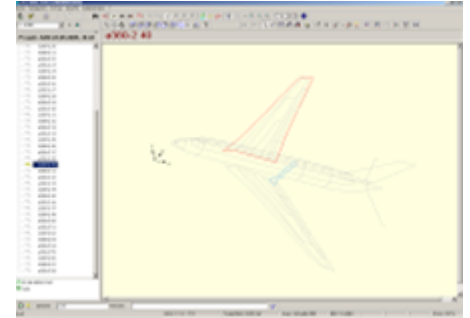


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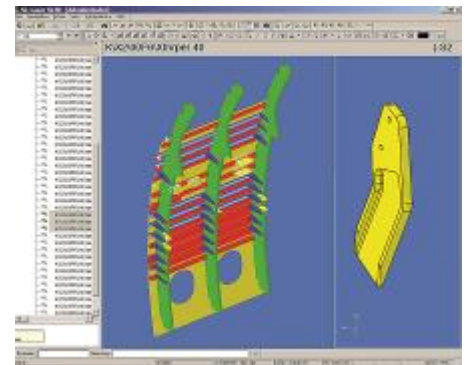
Laser projection system ProDirector 6, 5mW green

- Import Formats: IGES, STEP, DXF, APT, PLY, SL, GSI, XML
- Automated tools (Automatic selection of the ideal projector)
- Security and Process Security (Password protected, workflow protected, online guides, enforced brakes)
- Multi mould calibration (working on independent moulds)
- Special options (spring back): de-moulding after autoclave cycle there is a spring back and a deviation between model and demoulded part)



Extraonline-guides for production as text or graphical information that is displayed on the screen with the corresponding ply. E.g. a drawing or photo how to do perform this step.

The information is shown by the programmers button click or automatically when the ply is selected. Enforced “brakes” that guarantee a minimum timing for certain steps. E.g. after applying the vacuum bagging a countdown starts for five minutes to ensure the required time for compacting.



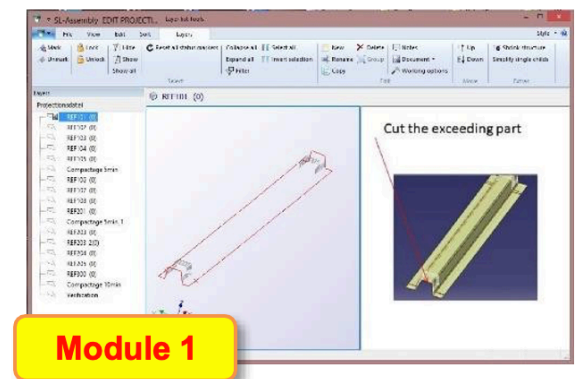
► ProDirector 6 ASSEMBLY SOFTWARE

The SL assembly software, designed for users who want to create a quick and easy way of projection files. The software has **3 MODULES**. Each Module has one license.

Module 1 – SK1LP-SOFT-SL-ASS-M1

Module 1 is included in the delivery of one bought ProDirector.

- Used for preparation and optimization of the projection files.
- Calibration files created and laser parameters generated.
- Projection files can be used separately without any further intervention in the production process.





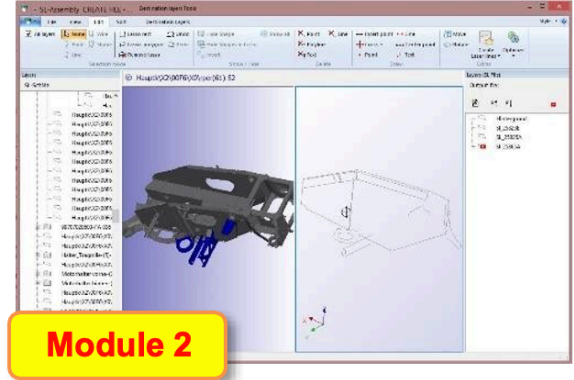
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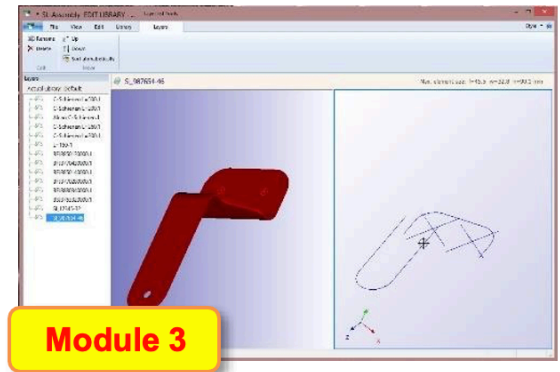
Module 2 – SK1LP-SOFT-SL-ASS-M2

- It is used to create 3D projection data from original files.
- Own projection sequences are created.
- For each sequence, you can add the lines of a 3D file in the projection file with various tools of the assembly software
- The dual display simplifies the processing



Module 3 – SK1LP-SOFT-SL-ASS-M3

When a component contains multiple elements (e.g. clips, mounting parts ...), a library can be generated. The software scans the complete component after Elements and creates through the Library the projection file.



ADVANTAGES OF SL3D SOFTWARE

- simple use
- data generated quickly
- no special CAD Software for data creation required
- no specific knowledge in CAD required
- good cost performance

► ProDirector 6 ACCESSORIES



Remote controls (ordered separately)

The remote controls consist of a hand transmitter and a receiver section on the projector or on the PC. They are very shock resistant and therefore suitable for industrial use. The hand transmitters have buttons for freely selectable functions. These button functions can be programmed individually via the SL software. We can offer you 4 variants of remote controls.



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Reference	Description	Image
SK1LP-BRC	<p>Bracelet Remote Control which the user always has with him and can confirm the laid parts for example. The operator saves himself time and does not need to go to the PC to confirm the situation or to have the other remote controls in his pocket.</p> <ul style="list-style-type: none"> • Range approx. 50m • Programmable action buttons • USB port • Operating frequency 868,95 Mhz • Operating temperature 0° C to 50°C • Storage temperature -10° C to +60°C 	
SK1LP-8BRC	<p>8-Button remote control with Joystick (Set) and a larger display. The joystick is often used to approach the calibration points or targets or to move the laser image.</p> <ul style="list-style-type: none"> • Transmission range 30m (Open field about 300 m) • Programmable action buttons • Direction keys for axis movement • With the 8 button remote control all important functions can be triggered <ol style="list-style-type: none"> 1. Laser calibration 2. Next Pen (Layer) represent number (image change – for example, contour) 3. Previous Pen (Layer) represent number (image change – for example, next ply) 4. Visual display of all the calibration target points 5. Confirmation of the position, then switch to the next ply 	



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SK1LP-ProDirector6-3D-G-05GN-1H Laser projection system ProDirector 6, 5mW green

<p>SK1LP-8BRC-JL</p>	<p>8-Button remote control JL (Set) with a display on which the layer name can be displayed.</p> <ul style="list-style-type: none"> • Transmission range 30m (Open field about 300 m) • Programmable action buttons • Direction keys for axis movement • With the 8 button remote control all important functions can be triggered <ol style="list-style-type: none"> 1. Laser calibration 2. Next Pen (Layer) represent number (image change – for example, contour) 3. Previous Pen (Layer) represent number (image change – for example, next ply) 4. Visual display of all the calibration target points 5. Confirmation of the position, then switch to the next ply 	
<p>SK1LP-TRC</p>	<p>Tablet Remote control of head. By choosing this option Internet Server license for Tablet remote SK1LP-LIC-TRC is needed.</p>	

Targets / calibration points

We can offer a large number of target points for different applications. These calibration points can be made in various modifications. The points are 0°, 45°, 90° and as universal targets with 180°.

For 2D applications, we use calibration points that are attached directly or indirectly to the application. For every area, timber industries, concrete, steel, we have different calibration points.



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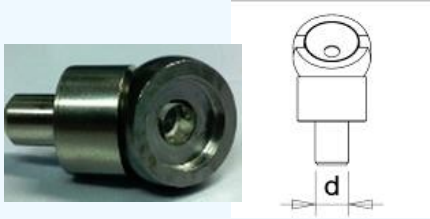

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Reference	Description	Image
SK1LP-FT-600 SK1LP-FT-635	<p>Flat Targets 0°, Ø 6.0 mm Flat Targets 0°, Ø 6.3 mm</p> <ul style="list-style-type: none"> • Ultra-accurate • Durable • Reliable • Easy to maintain 	
SK1LP-AT-600 SK1LP-AT-635	<p>Angled Targets 45°, Ø 6.0 mm Angled Targets 45°, Ø 6.3 mm</p> <ul style="list-style-type: none"> • Ultra-accurate • Durable • Reliable • Easy to maintain 	
SK1LP-AT-600 SK1LP-AT-635	<p>Target rotating, Ø 6.0 mm Target rotating, Ø 6.3 mm</p> <ul style="list-style-type: none"> • Ultra-accurate • Durable • Reliable • Easy to maintain <p>Targets are manufactured from stainless steel and we can also offer custom targets manufactured according to your specifications.</p>	
SK1LP-FTP-600 SK1LP-FTP-635	<p>Targets with Prism 0° Ø 6.0 mm Targets with Prism 0° Ø 6.3 mm</p> <p>Function: for laser calibration Material: 1.4301 Reflector: prismatic mirror</p>	



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SK1LP-ProDirector6-3D-G-05GN-1H Laser projection system ProDirector 6, 5mW green

<p>SK1LP-ATP-600 SK1LP-ATP-635</p>	<p>Targets with Prism 45° Ø 6.0 mm Targets with Prism 45° Ø 6.3 mm</p> <p>Function: for laser calibration Material: 1.4301 Reflector: prismatic mirror</p>	
<p>SK1LP-SLT-U-600 SK1LP-SLT-U-635</p>	<p>Targets SLT-U-0°-180° and 360° - d = Ø 6,0 mm, Offset: 12mm Targets SLT-U-0°-180° and 360° - d = Ø 6,3 mm, Offset: 12.75mm</p> <p>Function: for laser calibration Material: 1.4301 Reflector: prismatic mirror</p>	
<p>SK1LP-TRK</p>	<p>Targets Repair Kit</p> <p>1 screwdriver 1 tweezers 10 reflector dot High Grade 10 black ring 3 mm</p>	

► OPTIONAL

► ProDirector 6 Tilting Fixture SK1LP-TILTFIX

If you are using projection systems with one or more ProDirector laser projectors on different forms an optimal projection angle is important for best system performance.

For example, in multitooling applications, one or more projectors can be combined to project on multiple forms. Each component requires its own specially optimized angle to exploit the maximum projection area and the optimum angle can be changed manually by turning the devices by hand. This is risky and time consuming as the projectors are high above the work area. The ProDirector swivel device is the easy solution. A geared motor is setting the angle operated by two buttons.

The positioning of the laser is stepless and precise. Thus, you always have the best angle for the projection on the component.



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Power Supply

Voltage: 110 VAC / 230 VAC, Power: 24 VA

Fixture: Tube (40mm), Screw plate

Angle: Max/min: ± 45 degrees

Angle Velocity: Typ.: 90 degr. / 15s

Optionally you can order system with:

- PC (SK1LP-PC-STD)
- Notebook (SK1LP-PC-NOTE)
- Portable PC (SK1LP-PC-PORT)

Chosen solution will be supplied with installed Software in chosen language.

► **Portable PC ref. SK1LP-PC-PORT**

Performance of Hardware :

- CPU: Intel Core i5-3610ME 3.3GHz
- Dual Core CPU with Hyper Threading
- Hard disk: SSD 2.5" SATA INTEL120 GB
- RAM: DDR3 4.00 GB
- Keyboard: Standard with NUM Lock various languages
- Monitor: Industrial Touch Monitor "19"
- USP
- Power Supply: 100-240 VAC 50/60Hz



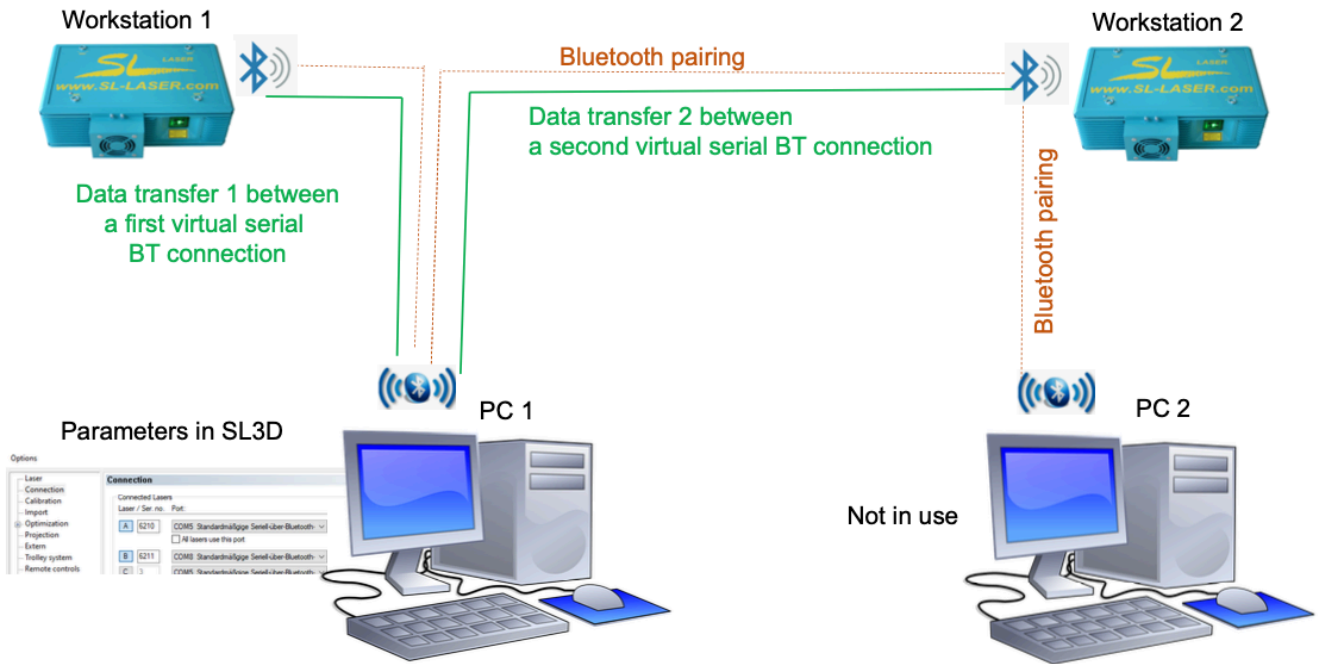
► **System of Uninterruptible power supply SK1LP-UPS USV**

- UPS for PC APC Back-UPS
- 650VA

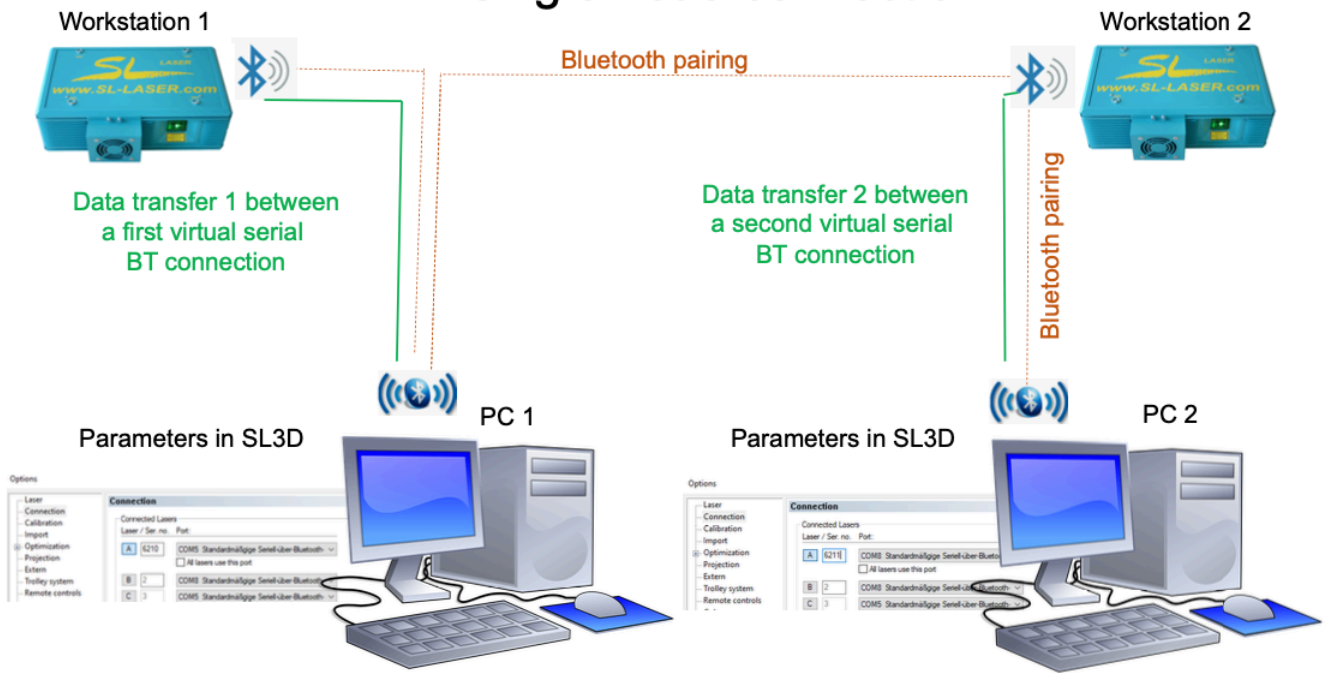
► **SK1LP-BLU Bluetooth system**

Bluetooth system includes device and adaptation on PC/Notebook and on Laserhead.

Double head connection



2 single head connection





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► Laser Certification Tool

The Certification Tool has two special tasks. First, due to the very precise, milled contours in the plate, you have the opportunity to document the accuracy of the laser beam.

Second, this tool is used to qualify the PROJECTORS so that the components can be manufactured using the qualified laser systems, especially for BOEING components.

The tools M and L can be tilted at different angles so that you can perform the test with the laser from different positions between the tool and the laser.



- Complete with targets
- CD-Rom with target file and projecting files
- Storage container

The certification tool can be ordered in 3 sizes:

- **Laser certification tool, large SK1LP-TOOL-L**
(Dimensions: length 1.75m x width 0.50m x height 1.30m)
- **Laser certification tool, medium SK1LP-TOOL-M**
(Dimensions: length 1.19m x width 0.50m x height 1.30m)
- **Laser certification tool, small SK1LP-TOOL-S**
(Dimensions: length 0.60m x width 0.60m x height 43mm)

► Converter box mono / dual heads SK1LP-MONO-DUAL



- Housing with switch, for converting a two-headed system to single-head systems
- Connection cables



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► Fiber orientation (angle) control system SK1LP-LIC-FOC+DEV

This system consists of 3 elements:

- A tool for controlling the fiber direction
- Library with the pictures from the different used composites materials
- Software interface for SL3D (special license)



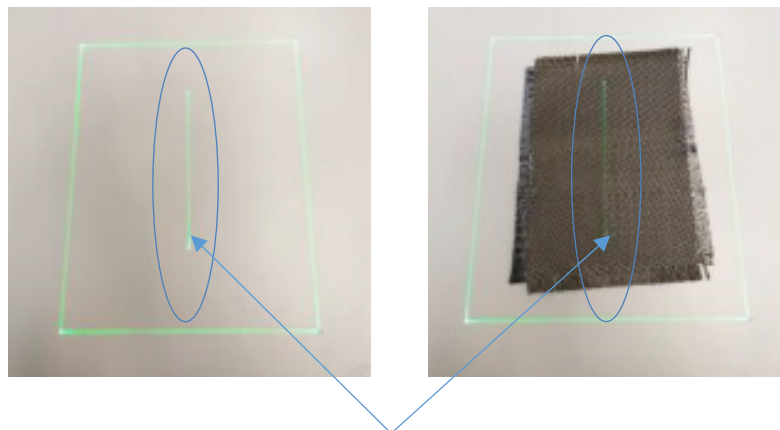
Scan tool



The device should be located face to the line!!

The operator put the control tool along the laser line. The system detects the real direction and calculate the angle. If the tolerance, set upped by the customer, is acceptable, SL3D confirm the layup sequence

For handling the device it's necessary to create the line in the layout drawings, that corresponds the fiber direction.



Laser line and fiber

This line can be inserted into the ply for projection or made as a separate layer for the device this line is 0 degrees

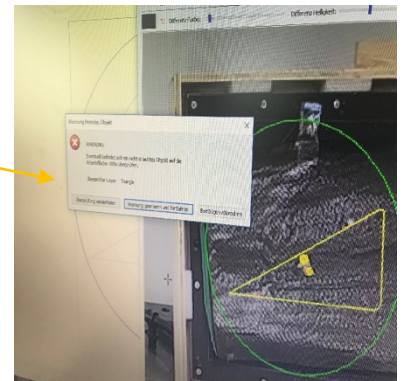
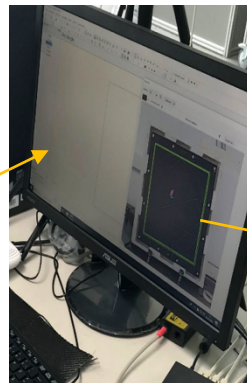
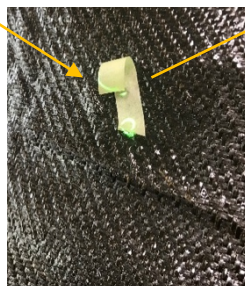


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► Detection system of foreign object SK1LP-LIC-DFO

- Software interface for SL3D (special license)
- **A camera system 5Mp with a wide-angle objective for optical control system SK1LP-CAM** The number of cameras depends of the geometry and the size from the tool where the laser or multiple lasers project.) Each laser head should be equipped with a camera.
- After the operator had confirm a layer, the camera system control if the system found a foreign object on the projection surface before project the next step. If yes, the laser project the position from the object and the software SL3D need a second confirmation to continue

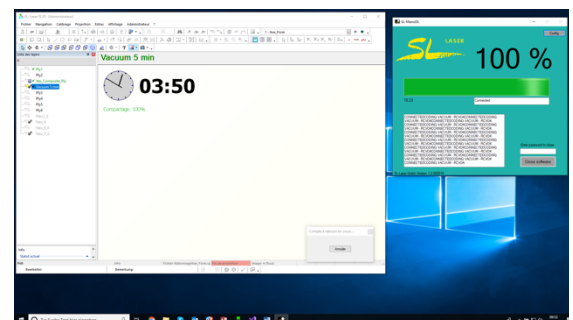


► Vacuum control test system

This is a special protocol for external control of vacuum test consisting of:

- Software interface for SL3D (special license)
- One vacuum device (manometer) per tool is supported in the SL3D. The ID is set with the dialog "Setup Vacuum ..."
- After programmed layer system is automatically inform operator about next step to be done: vacuum bagging.

PC with SL3D and SL-Mano Software





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- The default value indicates in % give the minimum value where the vacuum countdown is started. So, that operator cannot manipulate value / make bad vacuum bag / forget vacuum test
- SL3D displays the current status of the vacuuming in%: As long as the vacuum value is not reached, the countdown will not start and the display of the value will be light gray.
- When the minimum value is reached, the countdown starts and the display turns green.
- To do this, the device must constantly send the current value with VACUUM <value>

USB for connect to PC

Manometer



240 V

The vacuum control system is available in 2 options:

- **Vacuum control test system with cable connection for data transfer SK1LP-VAC-VAL-CAB**
- **Vacuum control test system with wireless connection for data transfer SK1LP-VAC-VAL-WLESS**

▶ **System SK1LP-LIC-BOUNDCONR - Interface for boundary control**

- This system includes special software interface for SL3D (special license)
- For the using of option, you need a camera system 5Mp with a wide-angle objective for optical control system SK1LP-CAM. The number of cameras depends of the geometry and the size from the tool where the laser or multiple lasers project. Each laser head should be equipped with a camera.



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The software and mounted optical camera(s) check boundaries of layers, comparing them to the set model with software. We want to pay your attention that check of boundaries by laying, is effective only when laying layers are in contrast colors. By placement "black on black", even the most sensitive camera should be located at least at distance 0.5-1.0m from the checked surface, which is not our case in serial production and also lighting in work shop has to be very bright. Also, a question to the acceptable tolerance of a deviation: means that deviation from laser projected line and position of layer will be quite big that cameras could "see" them at placement of layer.

► TRAINING

3 days training at the Customer's place including:

- Training for the operators on the laser system and SL3D software
- Training for the administrators on the laser system and SL3D software (extended)
- Training for the CAD department, creating Target and laser files (ply files)
- The training includes the explanation of the software and hardware and how it is working
- The training includes that on the second day the operators will work under supervision

► NOTE

Please contact us for more detailed information as well as for system development according to your technical specification.