

FAQ ver.

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CARTER PRODUCTS

Laser Computer Pattern Projection Systems



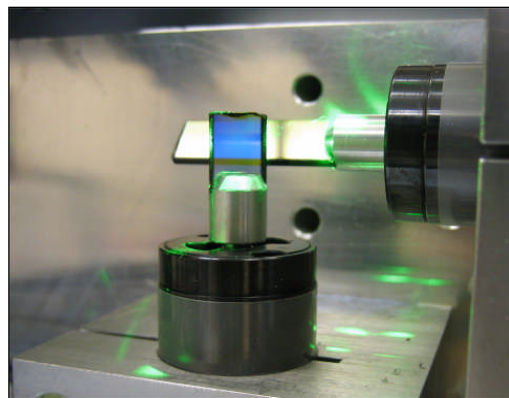
# FREQUENTLY ASKED QUESTIONS

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## ***1. What is a Laser Computer Pattern Projection System?***

A Laser Computer Pattern Projection System uses a laser (similar to those that have been used for years in Guide Line Lights for aligning material on rip-saws, bridge saws and such) to produce a pencil thin beam of light which is then directed onto two small movable mirrors set at right angles to each other. These mirrors are attached to galvanometers driven by electronics under precise computer control. By sweeping the mirrors through angular movements which are exactly timed with one another, it is possible to move the laser dot along the contours of a pattern dictated by the program in the computer. If the dot is moved quickly enough, the pattern appears to exist over its entirety even though the dot is continuously moving.



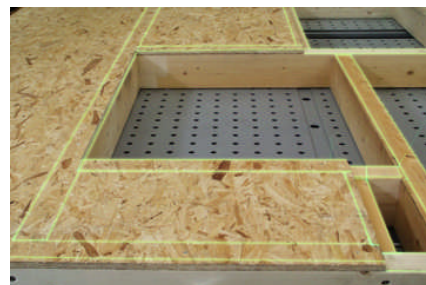
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## ***2. What are these products typically used for?***

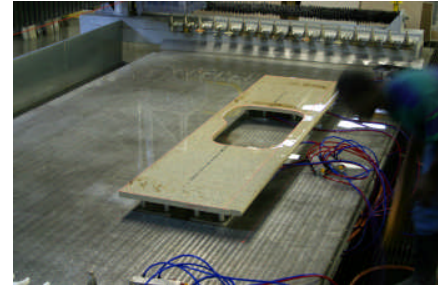
These products are used in a variety of industries such as wood, stone and plastics processing. They are also used in aerospace, metals, building components and vehicle fabrication. In short, they can be used in any application where it is helpful to precisely pre-visualize the path of a tool in a fabrication process or combination of elements in an assembly operation.



You can think of the Computer Pattern Projection System as a plotter, capable of "drawing" images directly onto any flat surface. No longer is it necessary to plot drawings to paper and then manually translate those dimensions onto the work surface through difficult, time consuming and error-prone measuring and marking. The System simply "floats" the image



onto the surface instantly -- in precisely the exact location and orientation you specify. And the image always remains on top of whatever material you place on that surface so it's always visible.



You can use the patterns to position holding fixtures on top of router beds or to position the part blanks on top of those fixtures for final production. You can outline multiple parts on large blanks before the cutting begins to determine the best positions for maximizing material yield or to facilitate placement of part numbers or bar code stickers for easy part identification and sorting after production. You can also use the System to align individual elements being brought together in assemblies, or to exactly match features in materials being stacked for multi-layer cutting. The possibilities are limited only by your imagination.

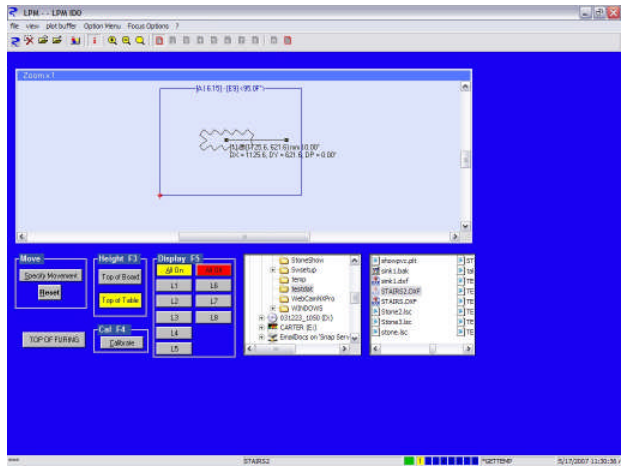
### ***3. What exactly is included with the system? Do I need to provide my own computer to control it?***

The System can be supplied with a control computer as an option, but it is also possible to utilize one of your existing computers for the job. The included graphical control software runs on the Windows operating system, but the basic projection and control functions can be accessed by any computer or controller capable of sending text strings over a standard COM port. The projector's main unit, which is mounted overhead the projection surface, is a sealed metal case containing the laser, power supplies, mirrors, galvanometers, and an onboard computer. Image file data and image control functions can be transferred directly to this onboard computer from the controlling computer through Ethernet cable using a standard network connection. Connection through a serial cable is also possible to allow compatibility with older machine controllers. Once the data has been transmitted to the projector, the projector assumes all the duties of controlling the projection of the image. Your host computer is available to do other work until it's time to pass additional information to the projector. The System also comes with an articulated ceiling mounting bracket for easy attachment to your overhead roof structure.

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**4. What sort of data files can be used to define the patterns?**

The included Windows graphical control software includes a built in DXF interpreter for direct projection of AutoCad compliant DXF files. Most modern CAD/CAM systems can easily provide output in this format. In addition, the System also natively understands standard HPGL (Hewlett Packard Graphics Language) files just as you would use for plotting to paper. Optional additional input filters can be made available for projecting directly from other data sources such as G-code files.



**5. How large is the projection unit? How is it physically mounted?**

The main projector unit weighs about 60 pounds and is about 32" by 12" by 7.5" in size. The case is of sturdy metal construction and comes with a basic mounting bracket for bolting the unit to a user supplied mounting structure. The included mounting brackets provide rotational adjustment in all axes to facilitate set-up and alignment.



***6. You say this system will project onto any flat surface. How large a surface will it cover?***

Models are available which offer mirror movement up to 80 degrees in both axes. This means that typically a single unit can cover an area up to 20 feet by 20 feet when mounted about 12 feet above the surface it is projecting onto. The actual height and angle at which the unit is mounted will of course determine the exact area of coverage. Larger areas can be covered by mounting the unit higher or by moving the unit toward one edge of the projection area and angling it back toward the center. Both of these approaches, however, will have an impact on maximum accuracy and the preferred installation is to center the unit over the projection area for optimum results.

***7. How does the system know what surface I'm projecting onto? What if the surface is not exactly flat and what about cases where the projector is mounted at an angle to the surface?***

Part of each installation routine is to "calibrate" the Laser Computer Pattern Projection System for the real world conditions under which it will be used. After the projection head is mounted above the projection surface and aligned as closely with the center of the surface as possible, the calibration routine begins. The installation software provides a graphical representation of the geometry of the installation and allows the installer to input the precise values for the locations of the corners of the rectangular projection area. These form the basis for the initial calibration of the system. The beam from the projector is steered to each of the corners in turn and the system "memorizes" the position of the corner points. The internal set-up routine then uses this information to compute a complete map of the entire projection area and to compute the position of the laser projector in relation to the user's coordinate system. This data is stored within the projector's non-volatile memory where it provides the basis for accurate projection of any pattern anywhere within the projector's field.

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***8. Is this installation and calibration something I have to do myself, or is help available?***

Though the process is straightforward and simple, we're available to provide optional installation services if desired. In most cases, the customer will provide the physical structure to which the projection head will attach and can then complete the set-up routine on his own. A detailed operation and installation manual is shipped with each projection unit. Carter factory personnel are available to provide free telephone support to assist the customer with the process if needed. We'll also gladly provide information on our on-site installation services and rates upon request.

***9. What happens if either the projection surface or the projector itself shifts its position later on? Will this entire process have to be repeated?***

No, that shouldn't be necessary unless the movement is very large. As part of the initial calibration set-up, reflecting elements will be permanently attached to the structure of the projection surface. The positions of these special permanent calibration points are internally stored within the System. At any time, you may run a very simple routine to compare the actual positions of these points with their stored positions. If there has been any change in position, the System will take it into account and automatically recalculate the projection parameters accordingly. This correction routine is so quick, it can easily be done each time a pattern is projected, if desired.

***10. I plan to use this system with a router. Earlier you said I could project patterns either onto the router bed itself (for fixture placement) or onto the tops of the fixtures (for part blank placement). How can this work when the tops of the fixtures lie so far above the top of the router table?***

The System's software includes a parameter for defining the height offset from the base surface for which it has been calibrated. By specifying an offset height value exactly equal to the height of your fixtures, you will cause the System to automatically resize and reposition patterns so that their shape and dimensions remain exactly right. A different height offset value can be associated with each

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pattern, so that regardless of what fixtures you use for a particular part, the pattern will be properly located and sized.

***11. I use a twin table router, alternately cutting the same pattern on opposite tables while reloading the other table. Will I have to establish separate patterns for each table?***

No, you won't. In addition to height offsets, you can specify that a pattern be projected with a particular offset in both the X and Y directions. This means that the same pattern used on one table can, with the proper offsets specified, be used to project onto the opposite table.

***12. I have very large assemblies and would need to cover patterns larger than the dimensions mentioned earlier. Is there any way this can be done?***

Yes there is. The advanced version of the System allows a single computer to control more than one projection head. The overall pattern is divided into sections, each of which is projected by a different projection head. Each projection head would be mounted over the area of the projection surface appropriate to the section of pattern it is responsible for. In this way, very large patterns can be produced. Such installations are generally custom in nature and we will work with you to help you determine exactly what is needed to meet your requirements.

***13. I'm in the stone processing business and my machines process very slowly compared to wood or plastic processing. Will the Laser Computer Projection System still help my production throughput?***

Absolutely! Stone processing is one of the fastest growing application areas for the Laser Projection System. Even though the machining processes are slow, having the ability to dramatically speed up setup times will improve throughput significantly. And the system can help produce more accurate, consistent setups to reduce errors that can cause waste of very expensive materials.

Projection of hold down fixture locations speeds up setup and ensures that no fixture will be improperly located such that it could cause damage to, or be damaged by, the router tool. Projection of the part blank shape eliminates the time

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consuming step of using the router head to place part locating pins and ensures that the correct blank has been chosen for processing. Projection of the final part shape shows the location of internal cuts such as sink cutouts, which can be important for judging the effects of local features or defects in the stone in relation to the final part shape.

Similar advantages are seen when projecting patterns for use with CNC waterjet machines. Though hold down fixtures are not typically used with waterjets, projection of part blanks and interior features still offers significant benefits in process speed, elimination of errors, and user safety. And the ability to project multiple parts at one time allows the operator to make manual part nesting decisions that can maximize yield from your material.

***14. What about stone sawing applications? I used to use physical templates to mark my saw patterns, but now I'm using an electronic templating method to determine my part geometry. Can the Laser Computer Projection System help me mark the stone for cutting without needing to produce physical marking templates?***

Yes. The System can be very helpful in this area. Just like you, many shops are making the transition to electronic templating systems to create data files defining the required geometry for the customer's parts. Though, these systems offer increased speed, accuracy and efficiency, when the measuring team returns to the shop they carry with them no physical template with which to mark the stone for cutting. Creating a wooden template requires time, material, and often the use of a secondary wood router. Printing a full size vinyl template incurs material costs and requires an expensive full scale printer – and such templates are awkward to handle and difficult to lay out accurately. Relying on printed, scaled drawings with dimensions requires time consuming measuring and marking which, unless done very carefully, is likely to result in potentially serious errors. A much better method is to project the part geometry at full size directly onto the stone through the use of the laser projector system.

Virtually all such electronic templating systems output industry standard DXF files which can be input immediately into the projector system. The geometric shapes contained within the file are then output as bright, highly visible light patterns on

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the surface of the stone. This allows an operator to quickly mark the end and corner positions of the required cuts so that these marks can be easily aligned with the bridge saw's laser indicator for accurate sawing. In addition, the System allows the projected image shapes to be moved and rotated through the use of simple software controls. This helps the operator to make optimum use of the stone's natural characteristics and shape in relation to the required finished part, without having to move the heavy stone itself.

The System also allows simultaneous projection of multiple template files with independent positioning of each file in relation to the others. This allows manual "nesting" of multiple parts to make the most efficient use of the available surface area.

***15. All this sounds interesting. Is there more information available?***

Yes. We'll be happy to send you our product DVD which shows the System in actual use in a wide variety of applications. We'll also include the full brochure and all the latest specifications so that you can see exactly how the Laser Computer Pattern Projection System can make your part and fixture positioning problems a thing of the past.

For complete information, please contact us at:

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