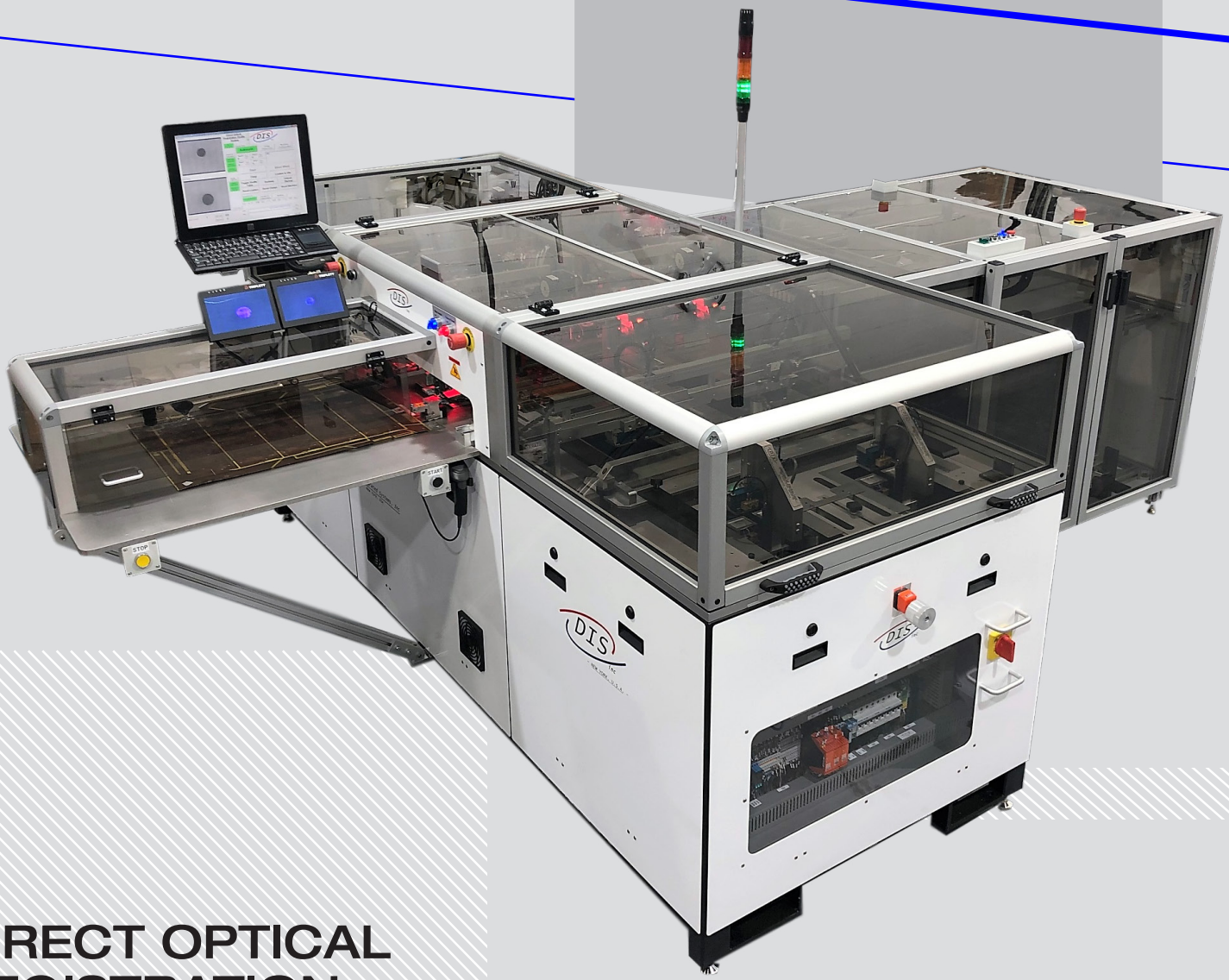
THE ULTIMATE OPTICAL LAY-UP STATION

DIS inc ®

REDEFINING ACCURACY



DIRECT OPTICAL REGISTRATION

ABOUT US

WORK IS EASY WHEN YOU HAVE ALL THE RIGHT TOOLS AROUND YOU!

Duetto Integrated Systems, Inc. was founded with the goal of designing and building automated systems that are more accurate. With decades of extensive experience designing and building PC board registration machines, we created a family of industry leading machines with unparalleled efficiency.

Since its founding in 1999 DIS's business has been multilayer registration. Through the years we have developed and refined the process, the methods and the equipment set to achieve the highest possible level of registration with the materials that are in use today. Our specialty is in providing applications and the process recommendations in registration. When installing a system our team of engineers not only trains our customers on the systems usage, but also guides our customers in every step of the process from imaging to lamination and inspection of every aspect of registration.

FUELED BY INNOVATION, WE AIM TO REDEFINE THE STANDARD FOR MULTI-LAYER REGISTRATION EQUIPMENT BY CONTINUALLY INNOVATING AND PROVIDING OUR UNIQUE APPLICATIONS SUPPORT.

TIMELINE

1999
DIS is Incorporated

2002
The first DOR System is Delivered

2006
DIS enters Asia Market

2006
SmartWeld System Introduced

2007
Array Lighting Scheme Introduced

2008
Pin Welding System Introduced

2008
Manual Flex System Introduced

2010
Granted Patents in Taiwan

2011
Granted U.S. & Worldwide Patents for
Direct Optical Registration

2012
Barcode Panel
Traceability Introduced

2013
Automated Flex & Rigid Flex
Systems Introduced

2014
Granted Patent for Multi-Camera
Measurement System

2016
Shipped 100th System

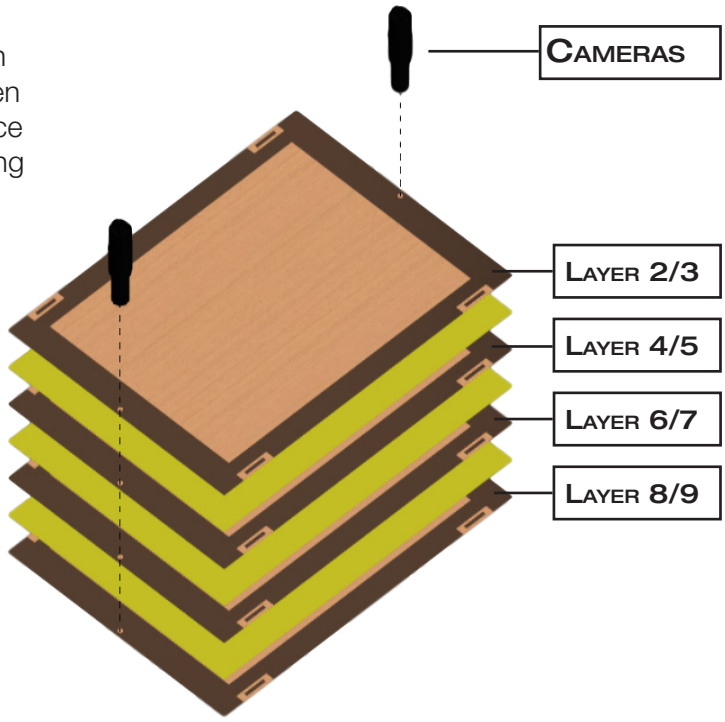
2019
Remote Set-up Wizard
Implemented

DIRECT OPTICAL REGISTRATION™

Direct Optical Registration™ is the cornerstone of DIS Inc. We developed this technology after seeing the shortcomings of manual lay-up pin lamination. Using Direct Optical Registration™ eliminates the handling tolerances, increasing the accuracy of layer-to-layer registration. Without the fixed tooling set-ups, a wider range of panel sizes can be processed.

Keeping efficiency as a key focus to a machine's workflow, we have kept our process simple. In our PRS and RFS machine families, when a job is set up, cameras are moved to a set dimension where they are locked in for the remainder of a job. This creates a set of reference points to which the targets are aligned, rather than measuring to the previous innerlayer's targets, eliminating an extra variable. Once an innerlayer has been positioned, it is then clamped down in place and won't be released until after the welding cycle.

Our Direct Optical Registration™ has only just begun to see its full capabilities. In our CMS machine and Multi-Camera preload systems, up to 10 cameras simultaneously measure targets, spread, innerlayer shape and front to back registration. This measurement data determines the best fit for each layer before entering alignment. With new developments in the works, we are constantly searching for more applications of Direct Optical Registration™.



- +/- 17 µm alignment tolerance or better
- Cameras stay fixed once job dimensions are set
- Easily align thin cores (1mil-25 µm)
- Layers are aligned to fixed reference point

CAPABILITIES

With an increasing range of panel thicknesses and materials entering the marketplace, having a machine with a wide range of processing capabilities is critical. The two figures below are DIS customer provided production panel cross sections of a 44-layer stack up (Figure 1) and a 34-layer stack up of mixed materials of different thickness and sub-laminated panels (Figure 2). The accompanying chart is a line graph of the Long Axis of the stack-up from Figure 1

- Repeatable alignment
- Discover lamination trends
- Easily transition between stack heights

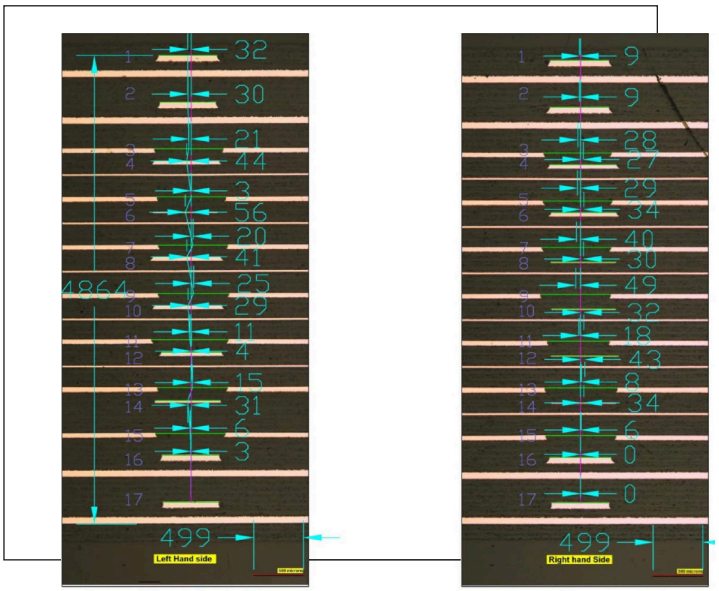


FIGURE 2

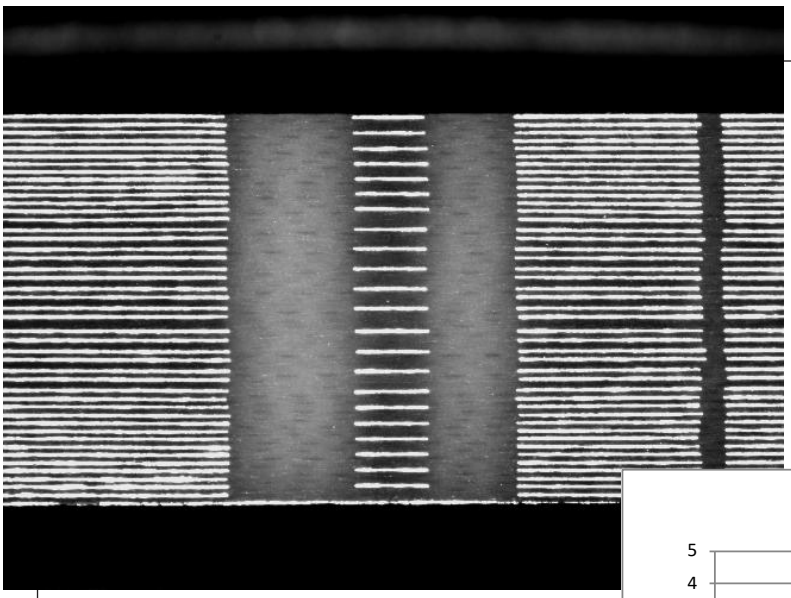
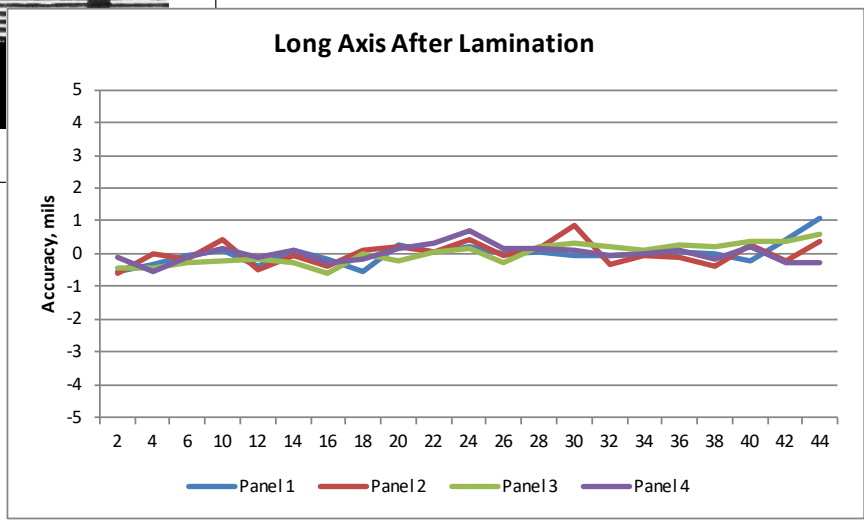


FIGURE 1

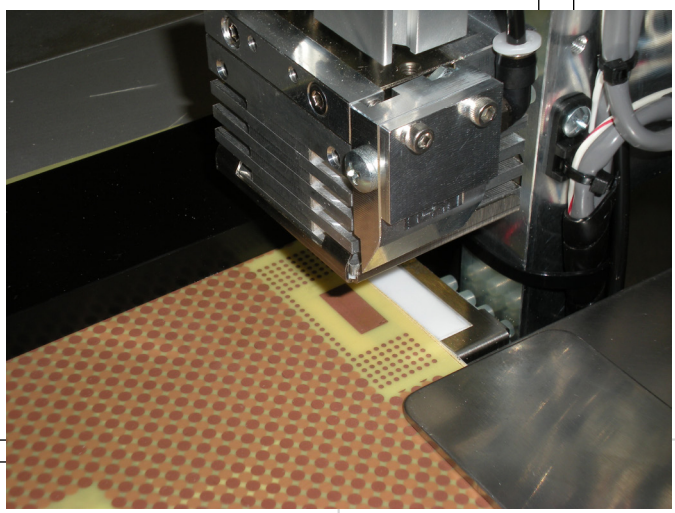


SMARTWELD™ TECHNOLOGY

SmartWeld™ is another industry leading innovation of DIS Inc. Our Patented Variable Coupled Inductive welding system allows rapid and precise heat control throughout a welding cycle. The entire cycle is programmable, allowing the process engineer control of the Ramp Rate, Hold Time and Cooling. The engineer can save a series of these weld profiles for faster referencing when choosing the next job.

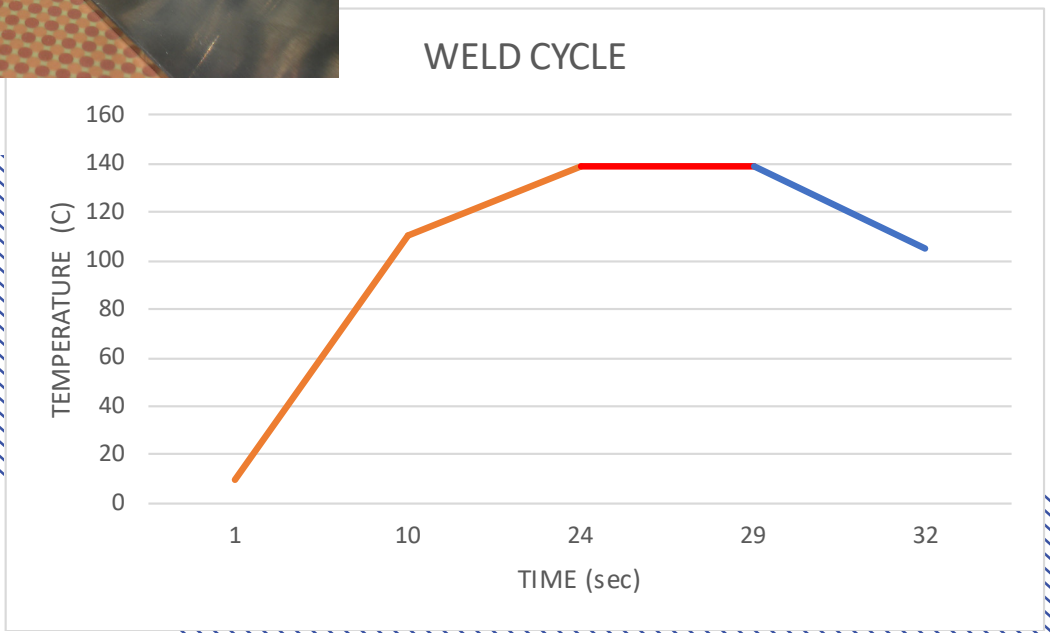
Each set of weld heads has a temperature feedback pad inside of an aluminum body allowing more accurate, and safe, use of temperature throughout weld cycle. The aluminum body is cool running, creating a more efficient weld. SmartWeld™ increases productivity by providing repeatable and predictable welds, cycle after cycle.

- Electrically coupled induction heads
- Contained electromagnetic fields
- Aluminum body design



Welding Process

The complete weld cycle is controlled similar to a lamination press cycle. The different parameters are set, such as maximum temperature, temperature ramp rate, hold (soak) time, cooling time and pressure. Each weld station is independently controlled for maximum flexibility.



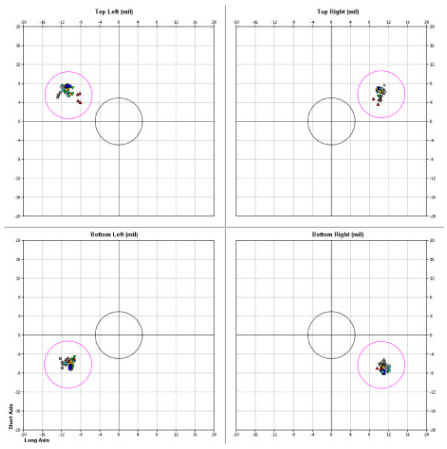
- Ramp Rate
- Weld Hold Time
- Cooling

PROCESS BENEFITS

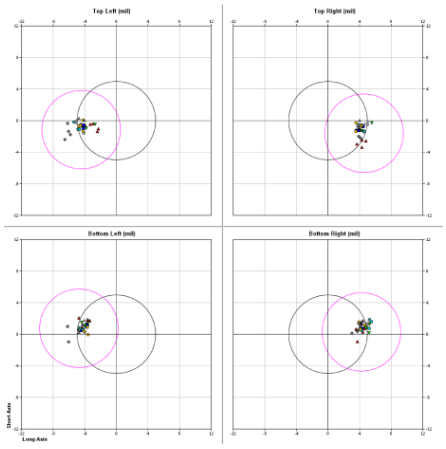
Panels can be measured after welding using an X-ray machine, this allows the process engineer to check the registration prior to the lamination cycle. This is not possible with any pin system.

After the lamination cycle, panels can be measured again. This allows the process engineer to check the registration and compare with the pre-lamination data, now it is possible to adjust the lamination cycle using real data.

X-Ray Measurements

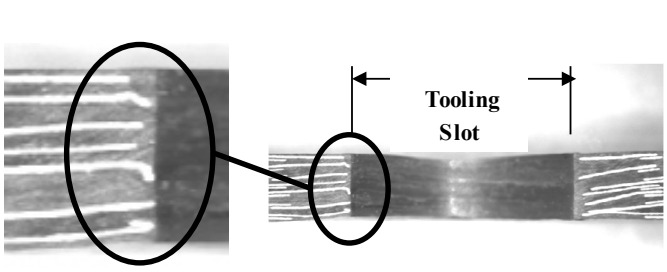


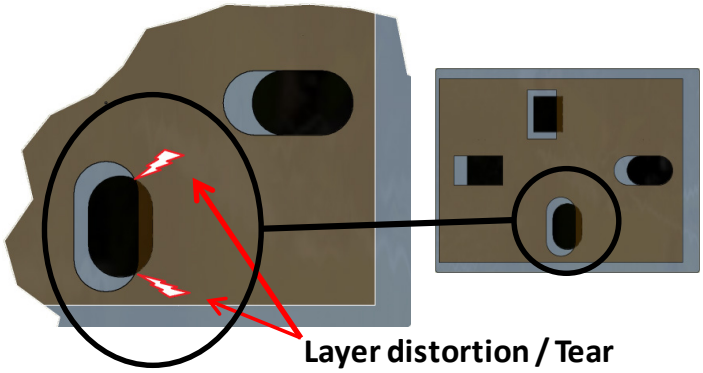
Pre-Lamination



Post-Lamination

Eliminate distortion of Innerlayers at lamination pin locations

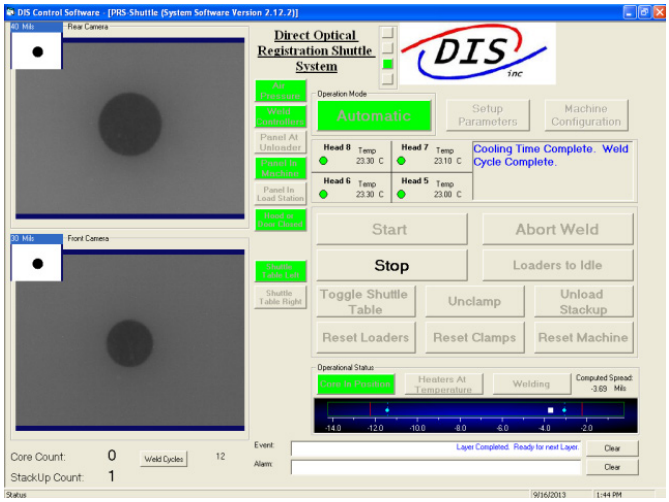




RIGID

PRS

PIN-LESS REGISTRATION SYSTEM



- MULTIPLE MACHINE CONFIGURATIONS TO BEST SUIT PRODUCTION VOLUMES
- CAPABLE OF HANDLING MULTIPLE STACK-UPS
- MODULAR UPGRADES AVAILABLE FOR PRE AND POST ALIGNMENT STATIONS
- USE SET-UP WIZARD TO REMOTELY PROGRAM AND EDIT JOB SET-UPS FOR FASTER THROUGHPUT

- PRS Shuttle with WPS

PANEL SIZE

13” x 14” to 24” x 30”

330mm x 355mm to
610mm x 762mm

FOOTPRINT

104” x 120” x 65”

264cm x 305cm x 165cm

PRS-STD

PANEL SIZE	FOOTPRINT
12” x 14” to 24” x 30”	48” x 43” x 65”
305mm x 355mm to 610mm x 762mm	122cm x 109cm x 165cm

PRS L/U

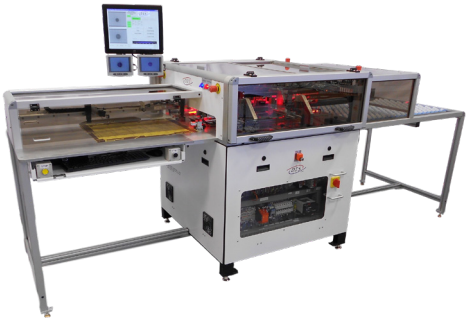
PANEL SIZE	FOOTPRINT
16” x 14” to 24” x 30”	32” x 99” x 65”
406mm x 355mm to 610mm x 762mm	81cm x 252cm x 165cm

ADDITIONAL INFORMATION
Automatic Unloading Feature with pass through design
Optional Offload Stacker Capability

PRS L/U Advanced

PANEL SIZE	FOOTPRINT
12” x 14” to 22” x 28”	32” x 99” x 65”
305mm x 355mm to 559mm x 711mm	81cm x 252cm x 165cm

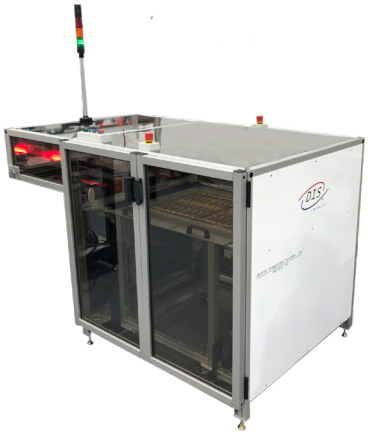
ADDITIONAL INFORMATION
Advanced unloading feature capable of processing smaller panel sizes



PRS L/U Extended

PANEL SIZE	FOOTPRINT
16” x 14” to 24” x 36”	32” x 131” x 65”
406mm x 355mm to 610mm x 915mm	81cm x 333cm x 165cm

ADDITIONAL INFORMATION
Capable of unique larger panels



WPS - Modular Stacker Unit

PANEL SIZE	FOOTPRINT
12” x 14” to 24” x 30”	45” x 42” x 69”
305mm x 355mm to 610mm x 760mm	115cm x 106cm x 176cm

ADDITIONAL INFORMATION
Modular Stacker Unit for PRS L/U, and PRS SH models.
Removable trolley

RIGID

CMS

CAMERA MEASUREMENT SYSTEM

- Display predictive modeling of the lay-up and a virtual build of the panel after lay-up
- Cameras can be moved to image area for more accurate measurement
- Multiple positioning algorithms can be chosen based on panel characteristics

PANEL SIZE

13” x 14” to 24” x 30”

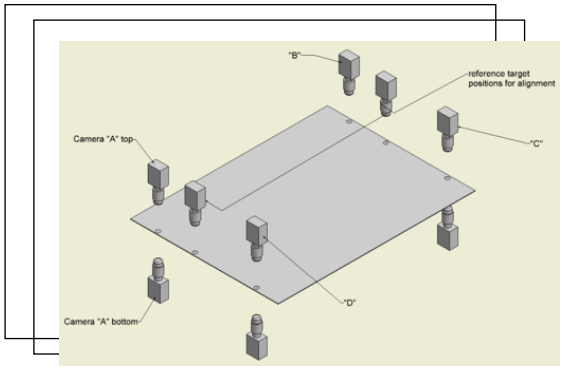
330mm x 355mm to 610mm x 760mm

FOOTPRINT

48” x 43” x 65”

121.9cm x 109.2cm x 165.1cm

Multi-Camera Preload Station



PRS L/U system with intergrated Multi-camera Preload station

RIGID-FLEX

MFS

MANUAL FLEX SYSTEM

- Unlimited bonding locations
- Available with dual independent heads
- Multiple head set-ups
  - SmartWeld™ Heads
  - Hot Heads
  - Combination of both (available on dual head systems)

PANEL SIZE

This system will process all panel sizes

FOOTPRINT

40” x 41” x 61”

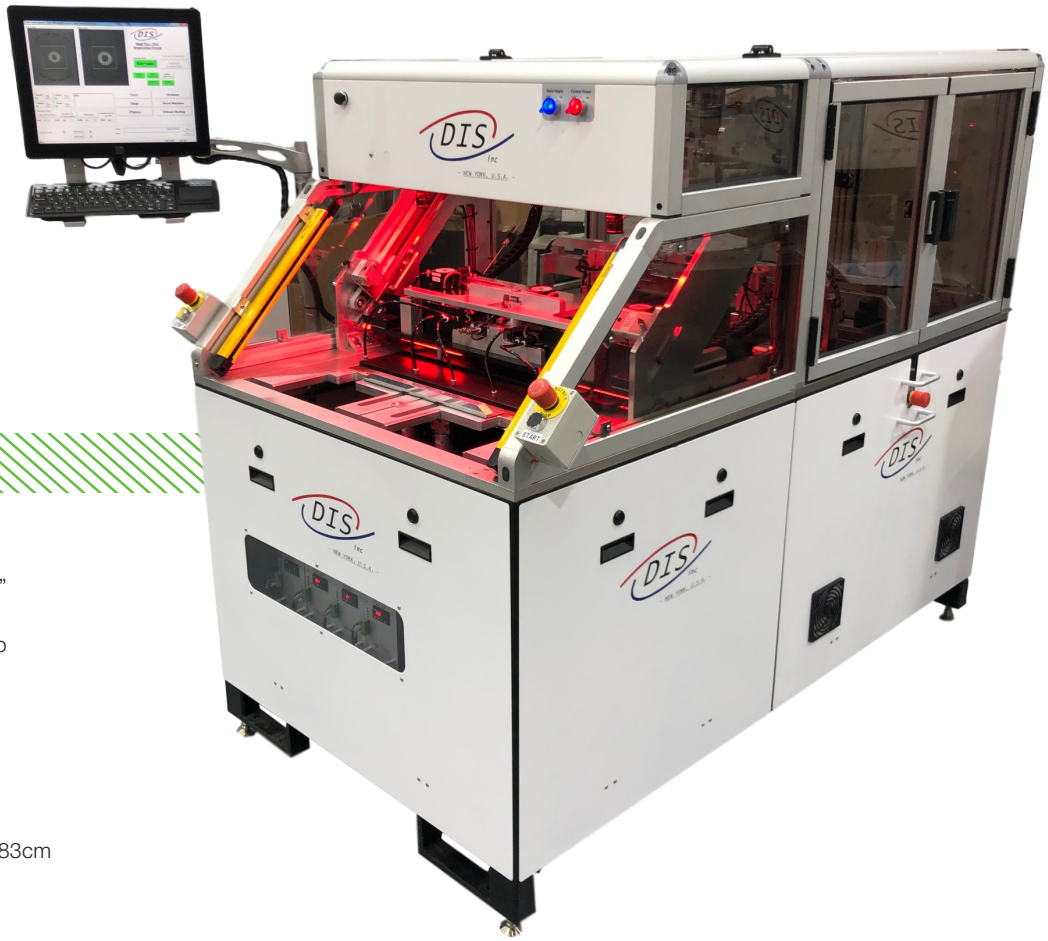
101.6cm x 104.2cm x 155cm

RIGID-FLEX

RFS

RIGID-FLEX SYSTEM

- Optically align and bond Rigid, Flex and Rigid-Flex boards
- Automatically aligns layers and pre-preg
- Allows for insertion of fillers
- Use Set-up Wizard to remotely program and edit job set-ups for faster throughput



PANEL SIZE
13" x 14" to 24"x 30"

330mm x 356mm to
610mm x 762mm

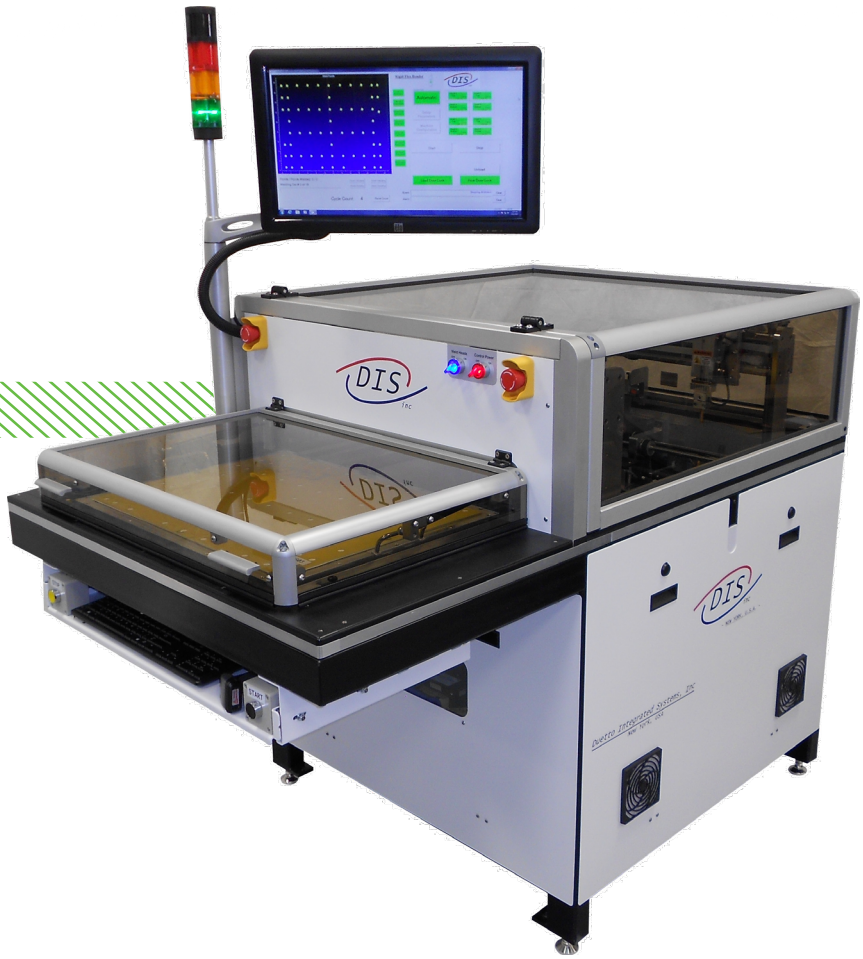
FOOTPRINT
90" x 54" x 72"

229cm x 137cm x 183cm

RFB

RIGID-FLEX BONDER

- Gerber data used to determine bond postions
- internal and perimeter bonding positions
- 8 movable bonding heads, 4 top and 4 bottom
- Multiple Head Set-ups
  - SmartWeld™ Heads
  - Hot Heads



PANEL SIZE
12” x 14” to 24” x 30”

305mm x 355mm to
610mm x 760mm

FOOTPRINT

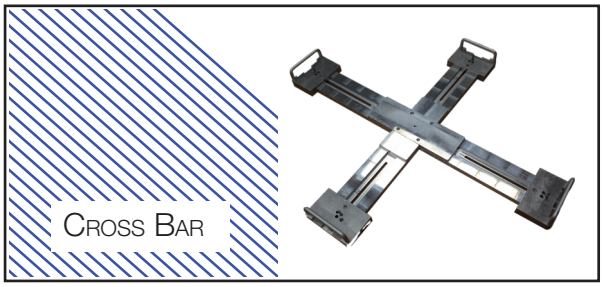
90” x 54” x 72”

229cm x 137cm x 183cm

PIN

PWS

PIN WELDING SYSTEM



- SmartWeld™ Technology
- Alignment pins are centerline locations
  (as specified by customer)
- Simple touch screen controls

- PWS 100

PANEL SIZE

10” x 12” to 24” x 28”

255cm x 305mm to
610mm x 710mm

FOOTPRINT

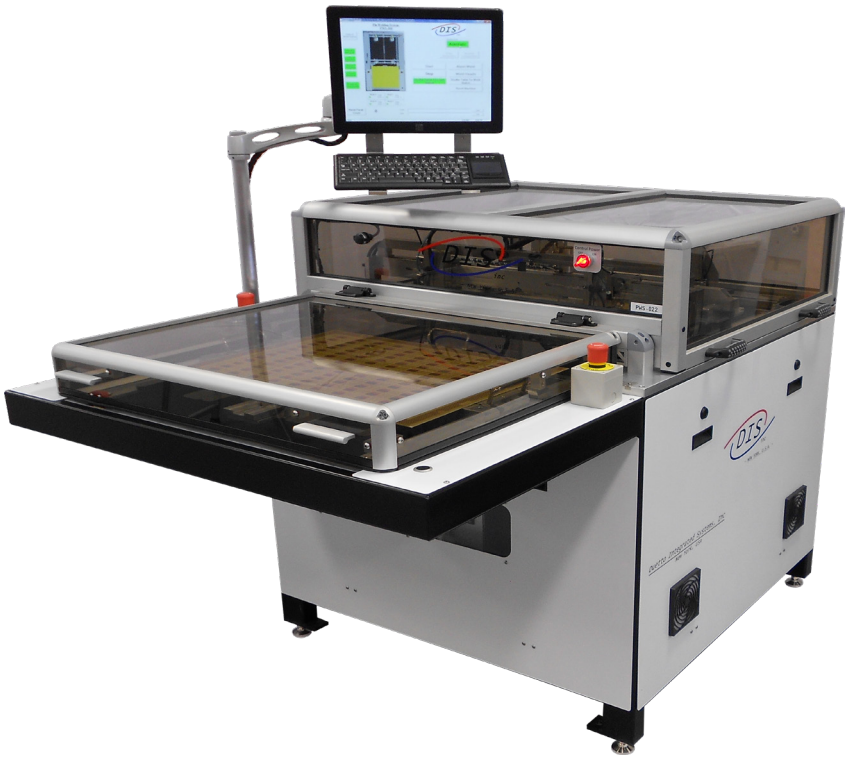
66” x 40” x 48”

102cm X 264cm X 122cm

ADDITIONAL INFORMATION

PLC based controls

PWS 500



PANEL SIZE

10” x 12” to 24” x 28”

255mm x 305mm to
610mm x 710mm

FOOTPRINT

40” X 104” X 63”

102cm X 264cm X 160cm

ADDITIONAL INFORMATION

PC based touch screen controls

Stores Set-ups and Historical Data

PWS Shuttle

PANEL SIZE

10” x 12” to 24” x 28”

255mm x 305mm to
610mm x 710mm

FOOTPRINT

104” x 40” x 63”

264cm x 102cm x 159cm

ADDITIONAL INFORMATION

PC based touch screen controls

Dual weld stations for increased throughput

Designed for ergonomic throughput in a high volume PCB shop

POST-ETCH PUNCH

VPR

VISION POSITIONING RETROFIT

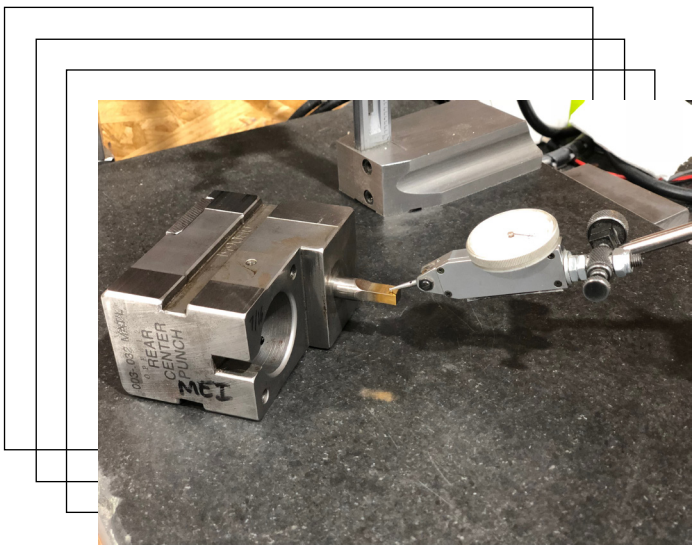
Seeing the growing share of outdated post-etch punches, DIS Inc. is using their years of experience to upgrade these OPE and Semi-OPE machines.

Each machine is evaluated by DIS Inc. ensuring that the punches, dies and castings (rails) are in good working order.

If the machine qualifies for upgrading, DIS Inc. begins manufacturing and completing many of the assemblies before the machine is delivered to us to decrease turnaround time.

Once at our facility the machine goes through an extensive rebuild.

The positioning and vision systems are removed along with all wiring and associated plumbing, replacing it with DIS Inc's XYY Positioners, eliminating the backlash associated with lead screws and are self cleaning.



Sharpening – Punch & Die Blocks:

DIS offers Punch & Die Block sharpening services. All punch and die block sets are evaluated for damages and missing parts. The punches and dies are removed from the blocks to be inspected determining if they can be reinstalled or need to be replaced. Punches that are sharpened are ground down and set to the correct length.

This service is also provided on most punching machines that have not been upgraded by DIS, Inc.

Standard OPE Upgrade

ATP & OPE 3000 series systems may also be upgraded and converted to standard OPE.

Proprietary DIS, Windows based, software with Data Logging and Ethernet connectivity

Automatic target acquisition eliminating the need for operator assistance.

New XYY positioning mechanism

Improved target recognition

New Digital Cameras

Optional conversion of two top cameras to colinear cameras, 2 top and 2 bottom

New Electrical and Control Package

New Touchscreen monitor

Elimination of halogen bulb light box with integral LED lighting.

Bulky stand alone console eliminated

All safety features are upgraded to the current safety standards including keyed magnetic interlock switches and a finger safe light curtain.

Semi OPE Upgrade

AAP artwork punches semi or automatic may also be upgraded to automatic punches

All upgrades listed in Standard OPE Upgrade additionally:

The positioning system manipulates the layer/artwork, converting a Semi machine into an Automatic machine.

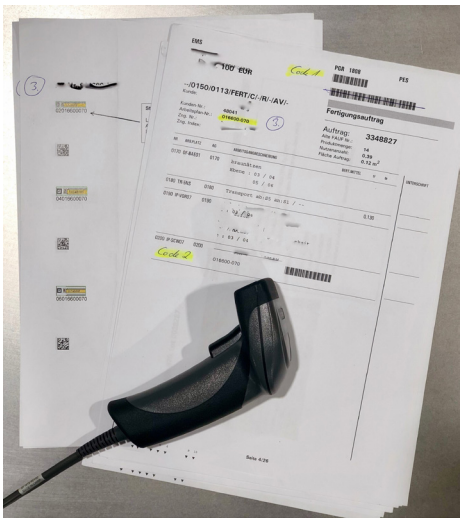
ACCESSORIES

MACHINE

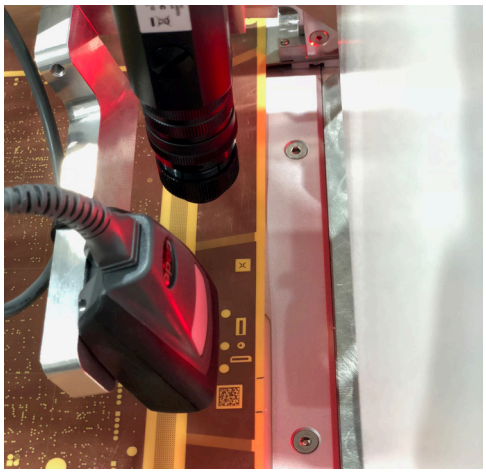
BARCODE SCANNERS

With the barcode scanner, operators can scan an entire stack-up into the computer to set alignment tolerances and weld profiles. This information can then be pre-loaded into a machine, saving time and ensuring that the layers are placed in the correct order during lay-up, creating a mistake proof process.

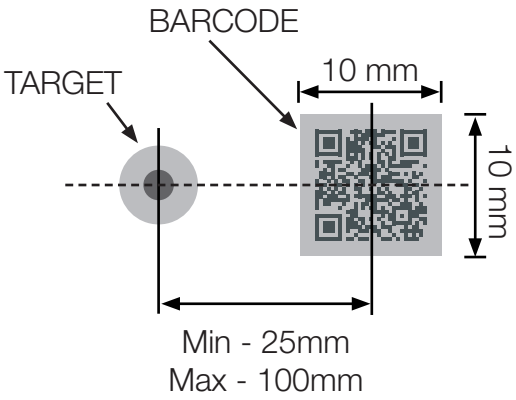
Available on: CMS, RFS, and PRS



Hand-Held Scanner



Machine-Mounted Scanner

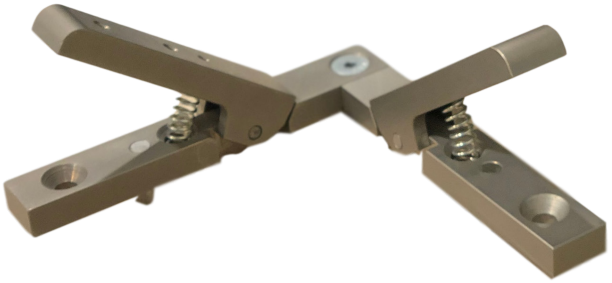


THICKNESS GAUGE

The Thickness Measurement option allows the engineer to enter layer and prepreg thickness in the job set-up along with tolerances. This feature minimizes the possibility of loading too many or too few prepregs.

Available on: All PRS-L/U & PRS-SH Machines

ACCESSORIES
LAMINATION



SPRING LOADED CORNER BLOCKS

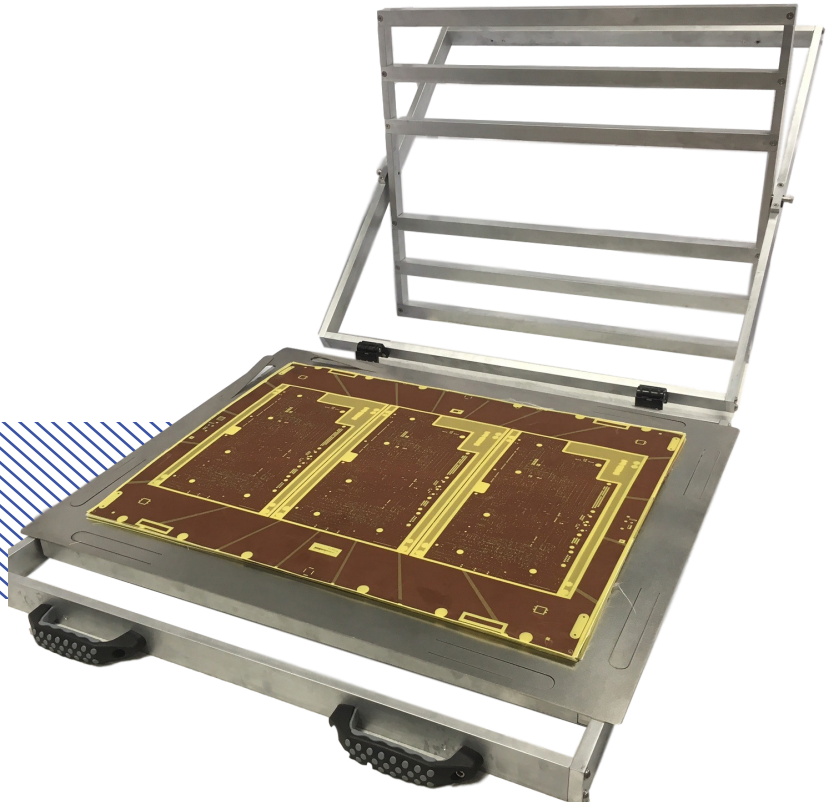
Corner Blocks allow for easy adjustment of multiple panel sizes. Using the blocks to hold the completed book eliminates the need for pins that could potentially damage the lamination press platens.

BLOCKING PLATES

Blocking Plates provide a lighter alternative to lamination plates with pins. No height calculations are needed. Each size specific set provides security for the panel during transportation between lay-up and lamination.

PANEL FLIPPER

The Panel Flipper is an essential tool to ensure the safe handling of welded panels prior to the lamination cycle. By evenly clamping welded panels together, operators can handle them without the risk of disrupting alignment when removing backer boards and completing the build by adding outer layer foils, separator plates and other build elements.



REDEFINING ACCURACY

Thank You

DIS, Inc. would like to thank you for your interest in our systems. We've placed years of careful research and development into each of our systems to bring you the highest quality products on the market. DIS, Inc. is here to work with you to ensure that each product purchased completely fulfills its need. On behalf of the entire DIS, Inc. team, we look forward to working with you.

Sincerely,

Anthony Faraci

Anthony Faraci
Founder & President

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