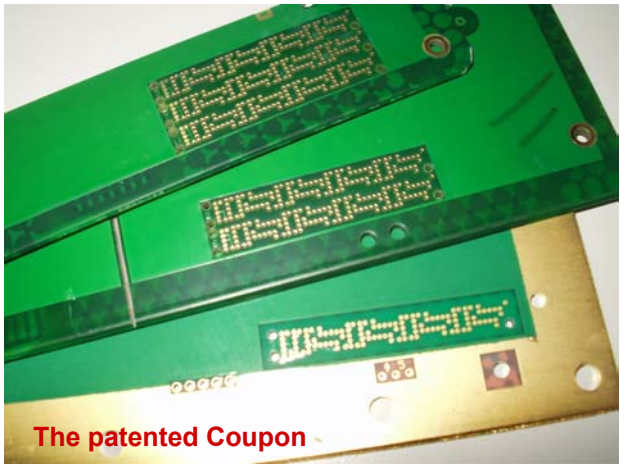
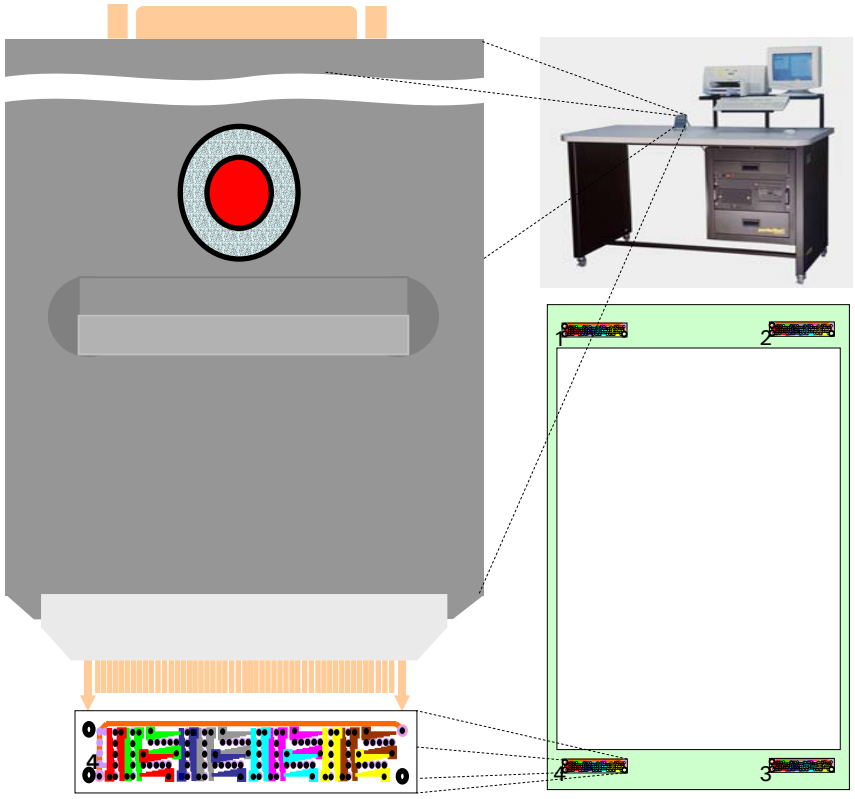
Solving Registration Problems on HDI PCBs



Precise Information **Within** Minutes

How the System works

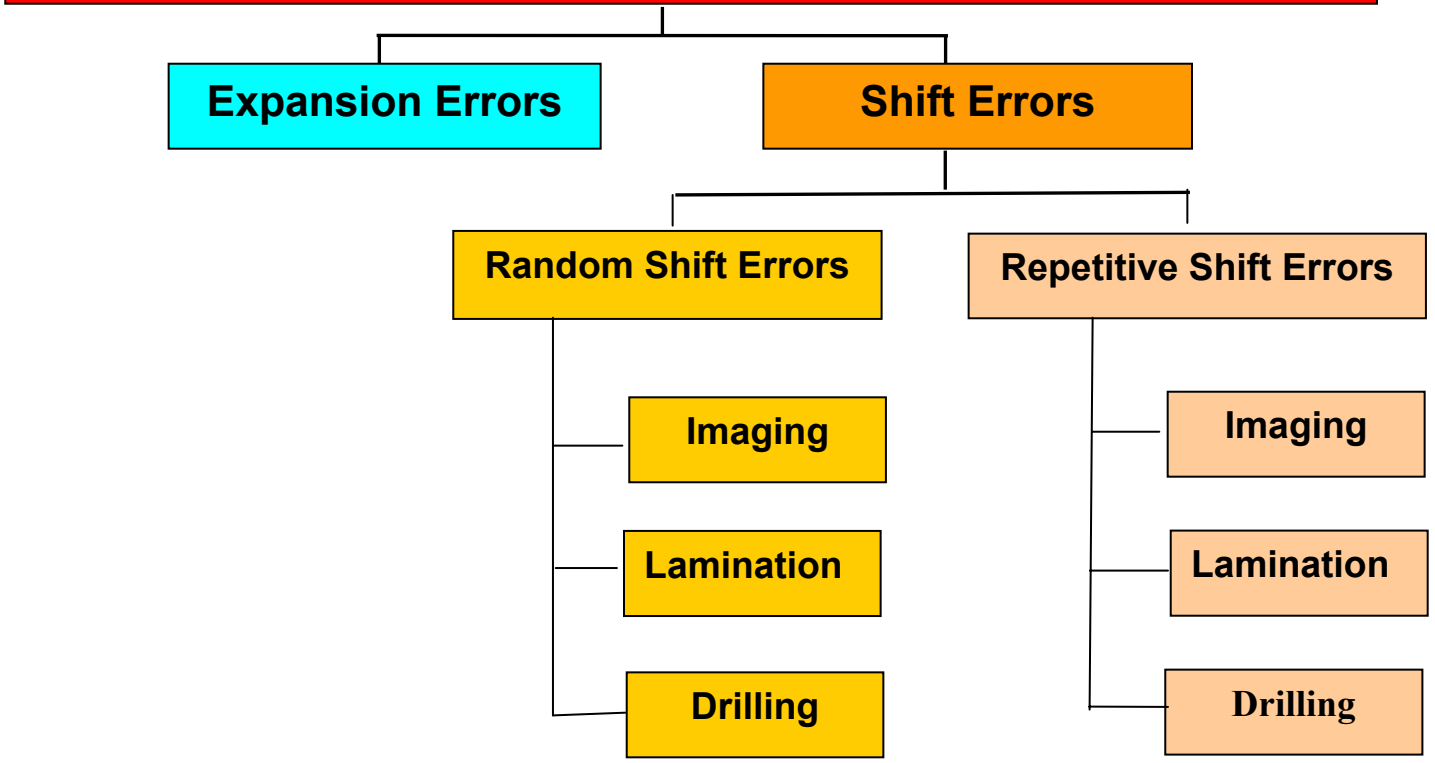


❑Fast Data collection

- Place probe on Coupon in the corners of the panel frame
- Push
- PerfecTest collects data upon contact of probe pins with coupon, instantly, accurately
- Non destructive test
- High throughput: up to six panels per minute
- Collect precise registration information from HDI PCBs of any construction.

perfecTest®

Causes of Registration Errors



Registration Errors are *always* a combination of different causes

perfecTest®

Separate the Causes of Registration Errors

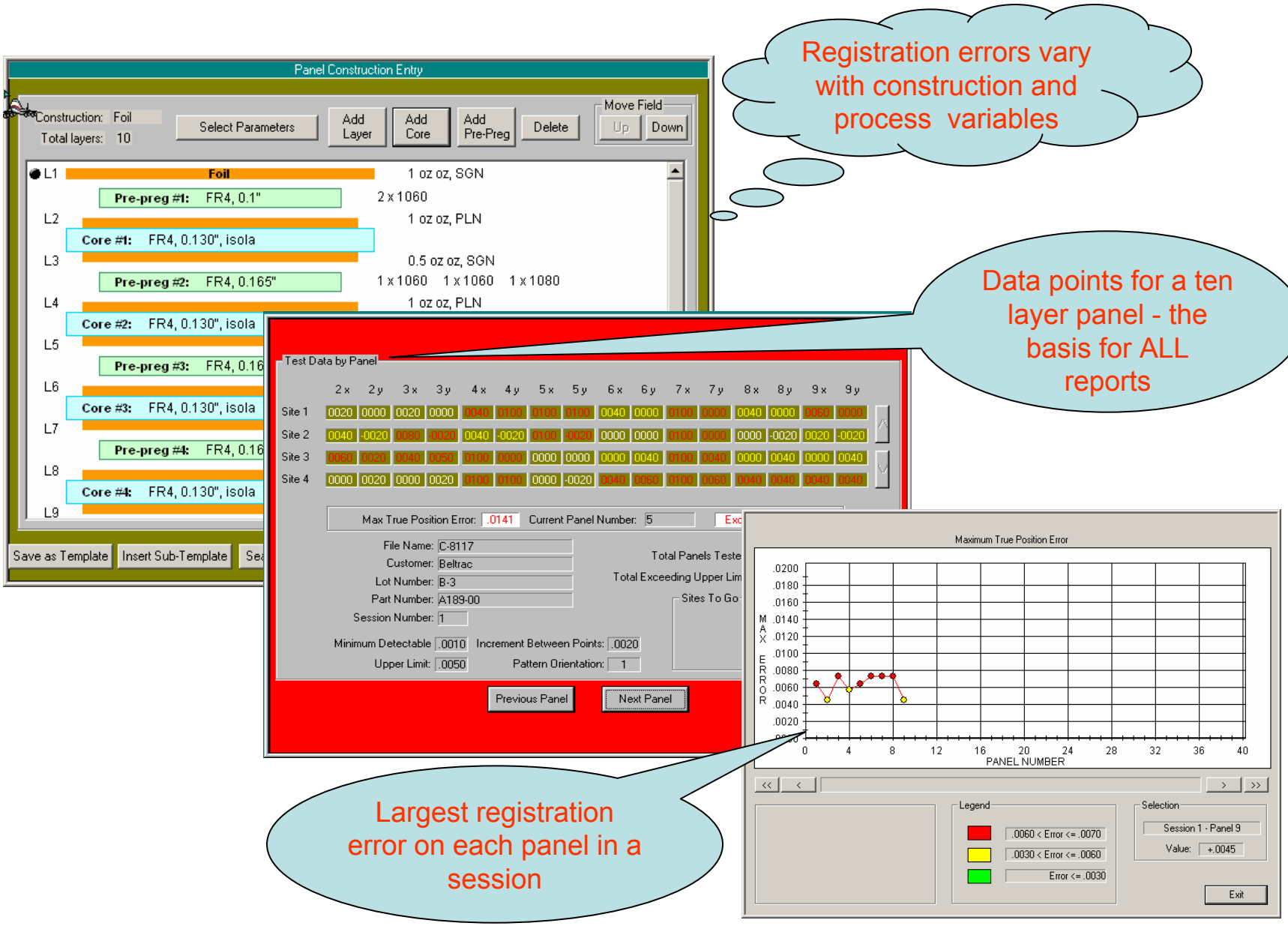
- Expansion errors occur when inadequate scaling factors are applied to the artwork. Expansion registration errors are job specific. They describe the *size* of layers of a specific job. Depending on materials, panel constructions, and fabrication processes, necessary scaling factors will differ with each job.

- Shift Errors describe the *location* of inner layers, cores, or panels during the fabrication process. Shift errors are caused by tooling inaccuracies or operator errors. Shift error patterns are typically repeated on different jobs.

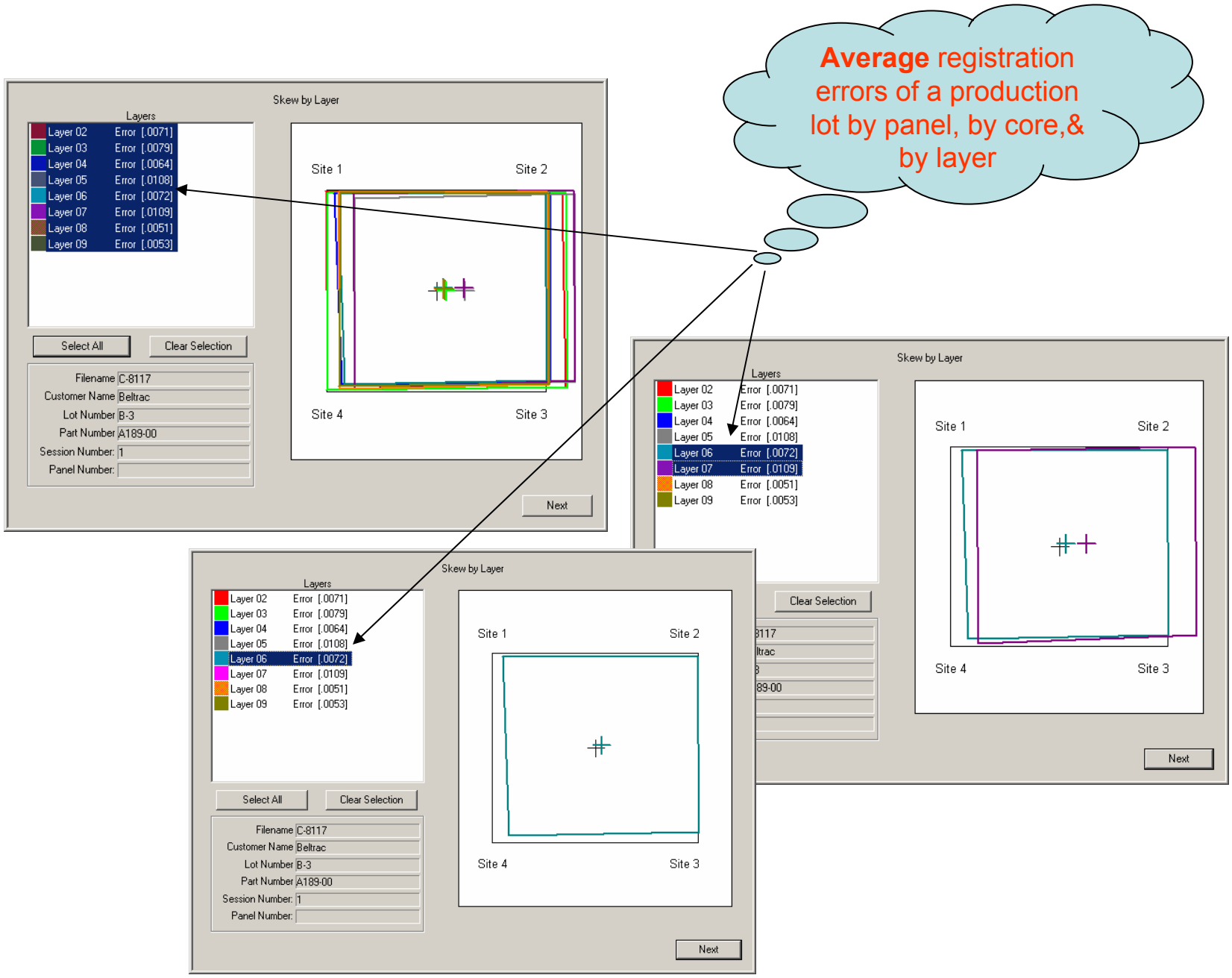
- *Expansion errors are corrected with better scaling factors.*

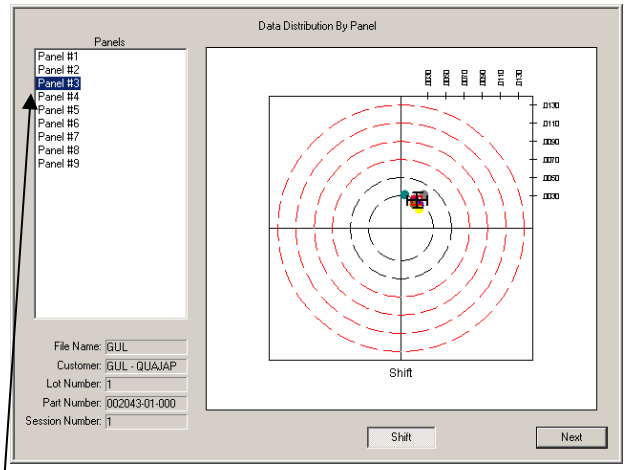
- *Shift errors are corrected with tooling adjustments and improved operating procedures*.

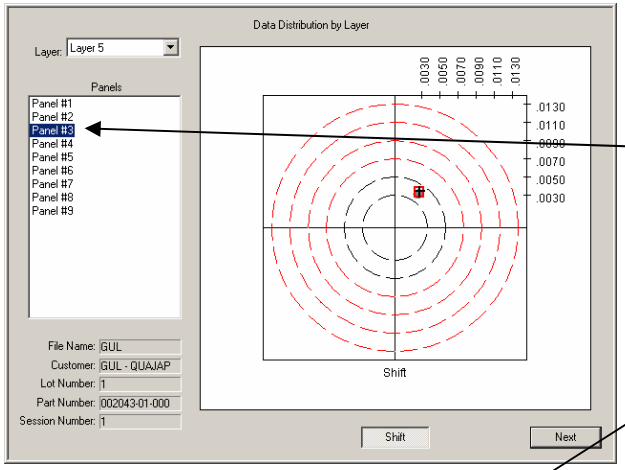
perfecTest®


Registration errors vary with construction and process variables
Panel Construction Entry
Construction: Foil
Total layers: 10
Select Parameters
Add Layer
Add Core
Add Pre-Preg
Delete
Move Field
Up
Down
L1 Foil 1 oz oz, SGN
Pre-preg #1: FR4, 0.1" 2 x 1060
L2 1 oz oz, PLN
Core #1: FR4, 0.130", isola
L3 0.5 oz oz, SGN
Pre-preg #2: FR4, 0.165" 1 x 1060 1 x 1060 1 x 1080
L4 1 oz oz, PLN
Core #2: FR4, 0.130", isola
L5
Pre-preg #3: FR4, 0.16
L6
Core #3: FR4, 0.130", isola
L7
Pre-preg #4: FR4, 0.16
L8
Core #4: FR4, 0.130", isola
L9
Save as Template
Insert Sub-Template
Data points for a ten layer panel - the basis for ALL reports
Test Data by Panel
2x 2y 3x 3y 4x 4y 5x 5y 6x 6y 7x 7y 8x 8y 9x 9y
Site 1 0020 0000 0020 0000 0040 0100 0100 0100 0040 0000 0100 0000 0040 0000 0060 0000
Site 2 0040 -0020 0060 -0020 0040 -0020 0100 -0020 0000 0000 0100 0000 0000 -0020 0020 -0020
Site 3 0060 0020 0040 0050 0100 0000 0000 0000 0000 0040 0100 0040 0000 0040 0000 0040
Site 4 0000 0020 0000 0020 0100 0100 0000 -0020 0040 0060 0100 0060 0040 0040 0040 0040
Max True Position Error: .0141
Current Panel Number: 5
File Name: C-8117
Customer: Beltrac
Lot Number: B-3
Part Number: A189-00
Session Number: 1
Total Panels Teste
Total Exceeding Upper Lim
Sites To Go
Minimum Detectable .0010
Increment Between Points: .0020
Upper Limit: .0050
Pattern Orientation: 1
Previous Panel
Next Panel
Largest registration error on each panel in a session
Maximum True Position Error
MAX ERROR
.0200 .0180 .0160 .0140 .0120 .0100 .0080 .0060 .0040 .0020
0 4 8 12 16 20 24 28 32 36 40
PANEL NUMBER
Legend
.0060 < Error <= .0070
.0030 < Error <= .0060
Error <= .0030
Selection
Session 1 - Panel 9
Value: +.0045
Exit

Material Expansion And Shift
Panel Infomation
Filename GUL
Customer Name GUL - QUAJAP
Part Number 002043-01-000
Construction Type Foil
Panel Layout M_BAL
Panel Size 18.00x21.00
Total Layers 10
Total Panels Tested: 9
Total Above Upper Limit: 7
Session Infomation
Session Number: 1
Lot Number 1
Optional Parameter 1 evaluation
Optional Parameter 2
Date/Time Tested: May 31, 2005 / 15:20
Minimum Detectable Error: .0010
Upper Limit: .0050
Increment Between Points: .0020
Pattern Orientation: 1
Average Material Expansion
Average Layer Shift
Layer X - Expansion Y - Expansion X - Shift Y - Shift
02 -.0030 -.0002 +.0012 +.0009
03 -.0028 -.0014 +.0011 +.0013
04 -.0020 -.0010 +.0010 +.0005
05 -.0020 -.0006 +.0018 +.0005
06 -.0024 -.0021 +.0010 +.0012
07 -.0029 +.0002 +.0008 +.0009
08 -.0022 -.0011 +.0014 +.0007
09 -.0017 -.0010 +.0017 +.0006
OK
Average Expansion & average Shift errors of all inner layers
Corrected scale factors for all inner layers.
Layer X - Error X - Original Scaling Factor X - Corrected Scaling Factor Y - Error Y - Original Scaling Factor Y - Corrected Scaling Factor
02 -.0030 1.00118 1.00136 -.0002 1.00003 1.00005
03 -.0028 1.00118 1.00135 -.0014 1.00003 1.00013
04 -.0020 1.00118 1.00130 -.0010 1.00003 1.00010
05 -.0020 1.00118 1.00130 -.0006 1.00003 1.00007
06 -.0024 1.00118 1.00133 -.0021 1.00003 1.00018
07 -.0029 1.00118 1.00135 +.0002 1.00003 1.00001
08 -.0022 1.00118 1.00131 -.0011 1.00003 1.00011
09 -.0017 1.00118 1.00128 -.0010 1.00003 1.00010
OK

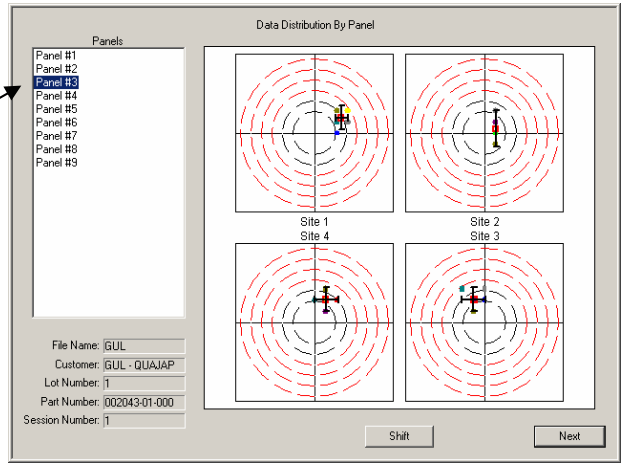

Average registration errors of a production lot by panel, by core,& by layer
Skew by Layer
Layers
Layer 02 Error [.0071]
Layer 03 Error [.0079]
Layer 04 Error [.0064]
Layer 05 Error [.0108]
Layer 06 Error [.0072]
Layer 07 Error [.0109]
Layer 08 Error [.0051]
Layer 09 Error [.0053]
Site 1
Site 2
Site 4
Site 3
Select All
Clear Selection
Filename C-8117
Customer Name Beltrac
Lot Number B-3
Part Number A189-00
Session Number: 1
Panel Number:
Next

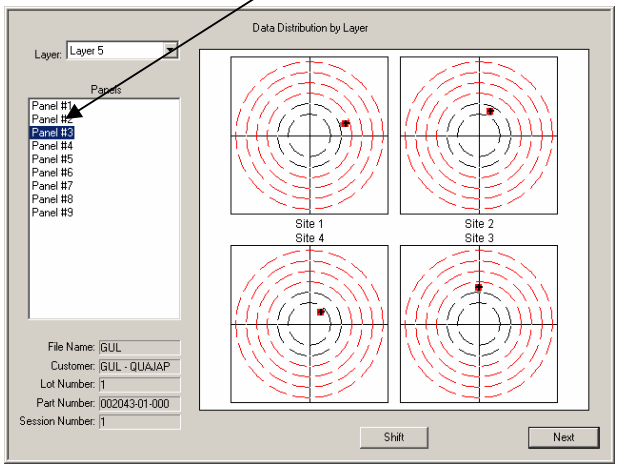


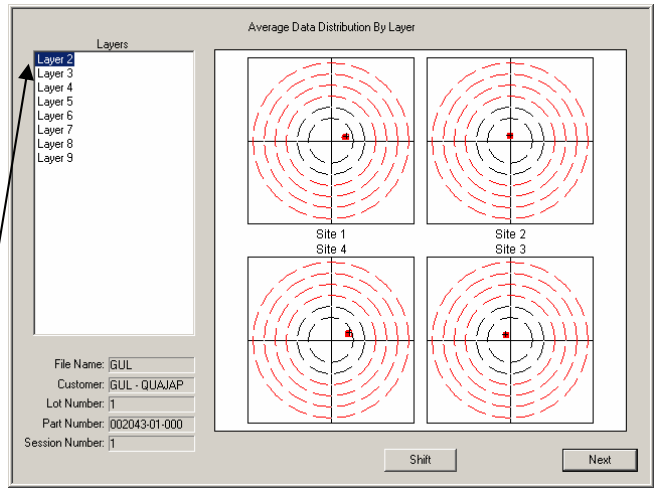


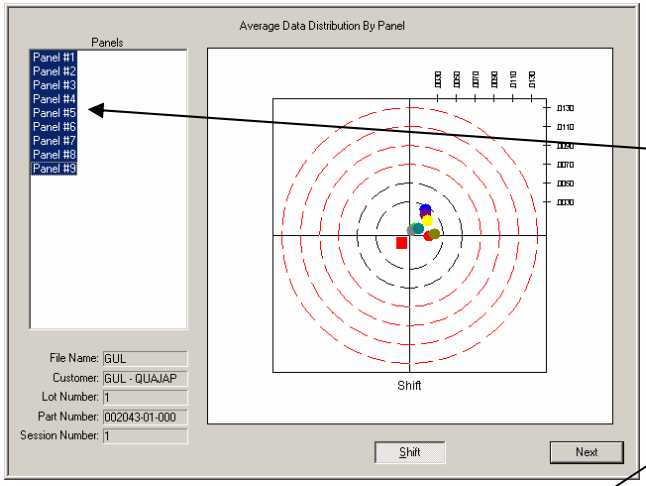
Single **layer** registration error details

Single **panel** registration error Details



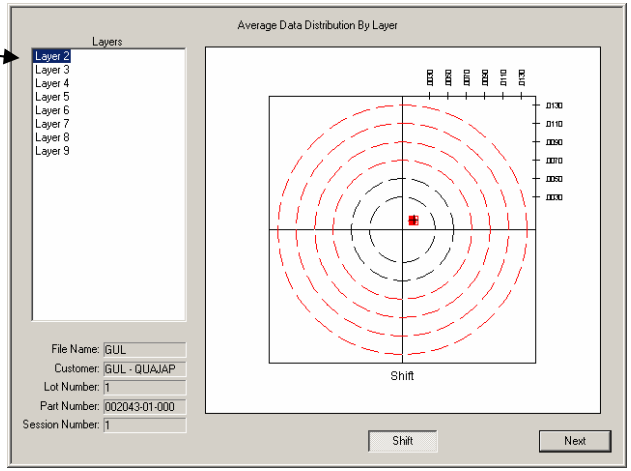


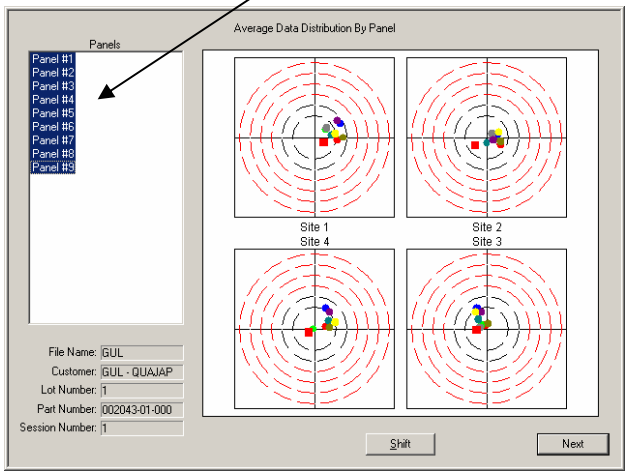


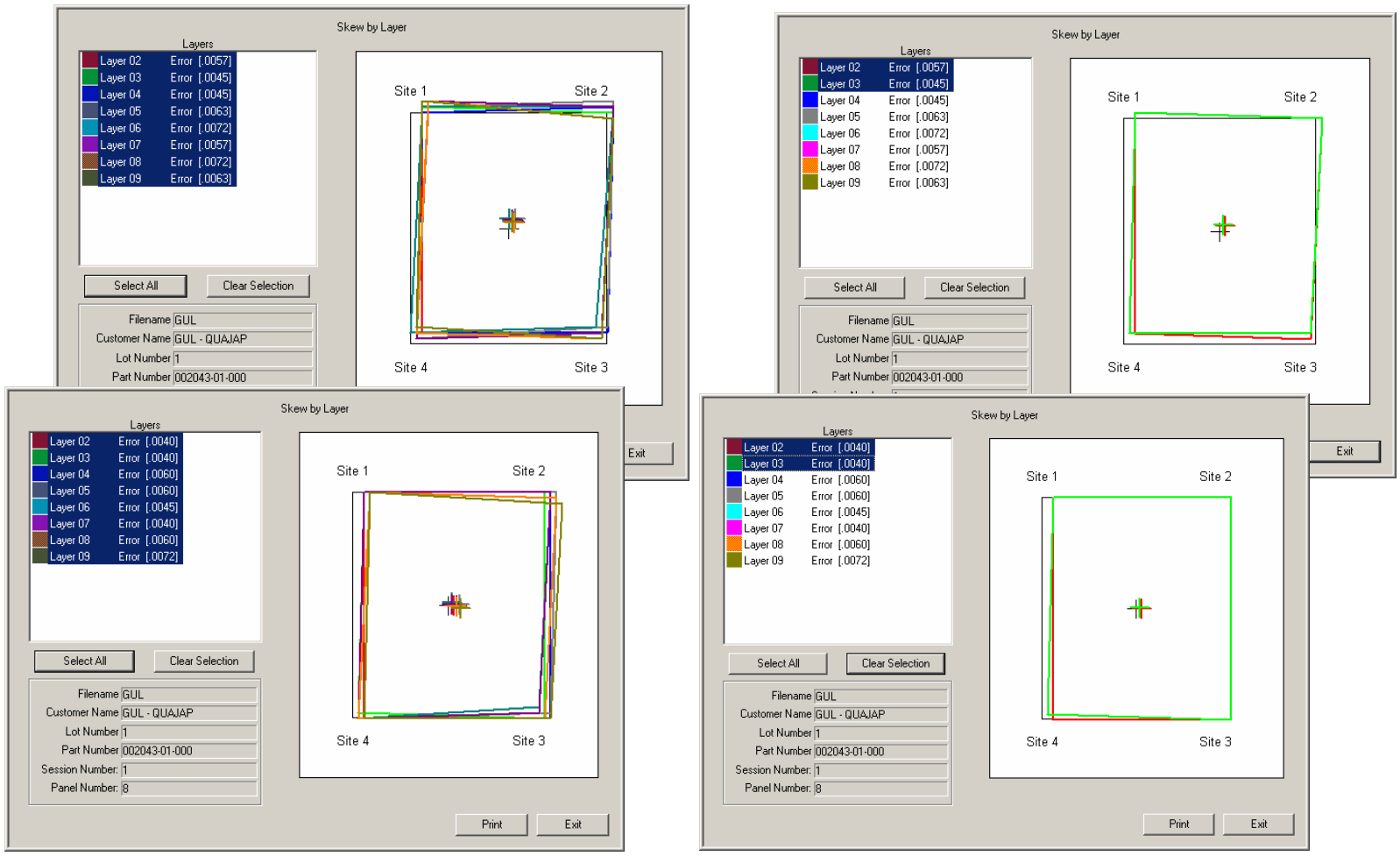


Average panel errors from multiple panels

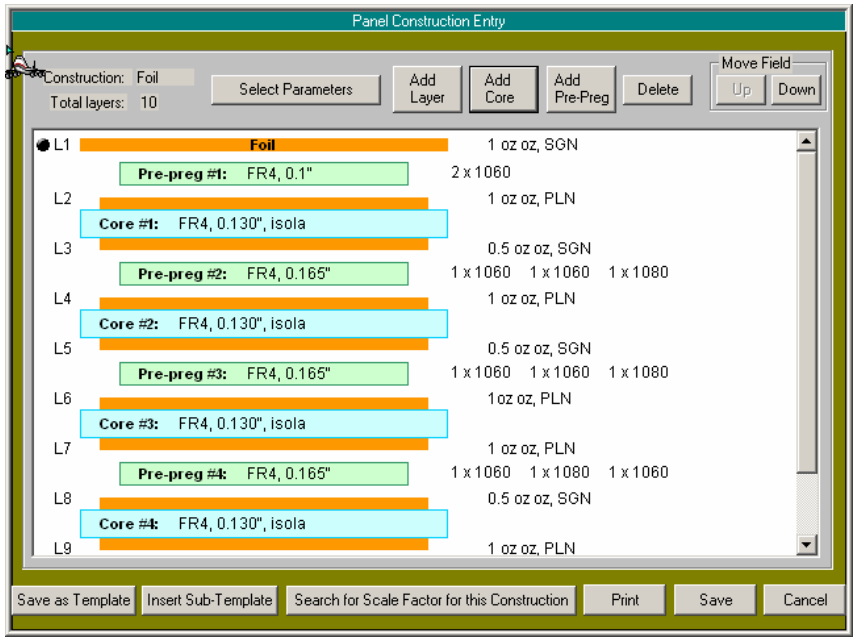
Average layer errors from multiple panels

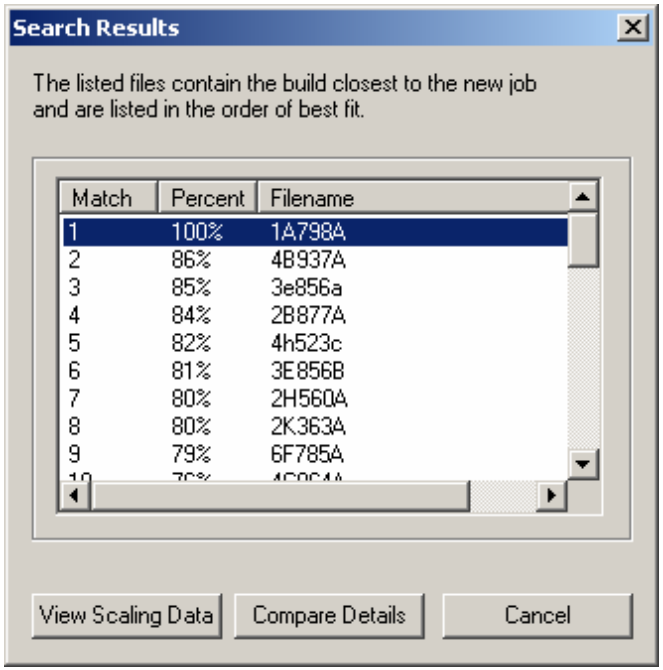


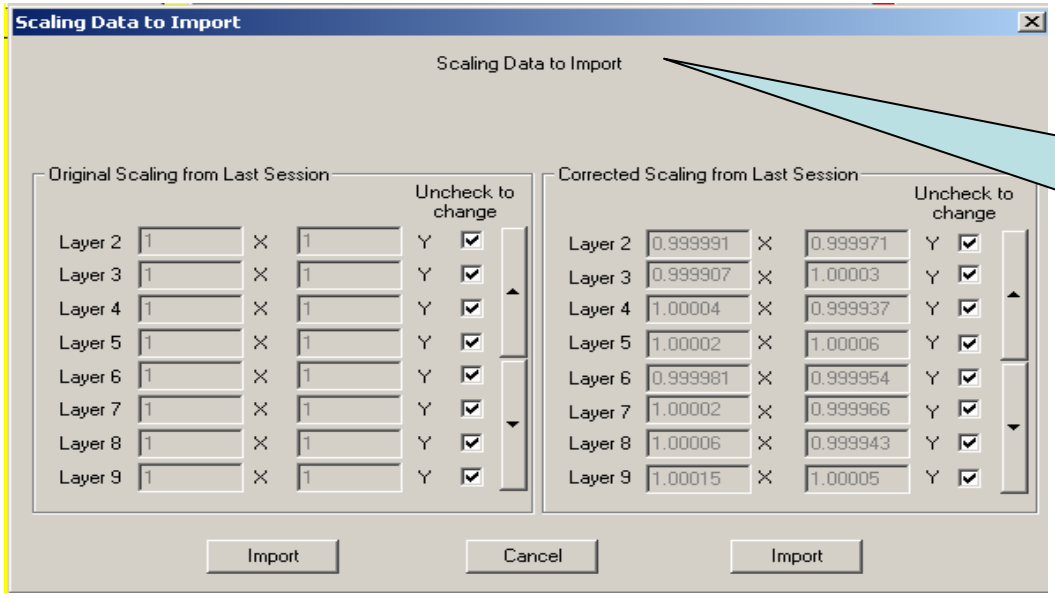




Inner layer images of
individual panels, selectable
in any desired combination







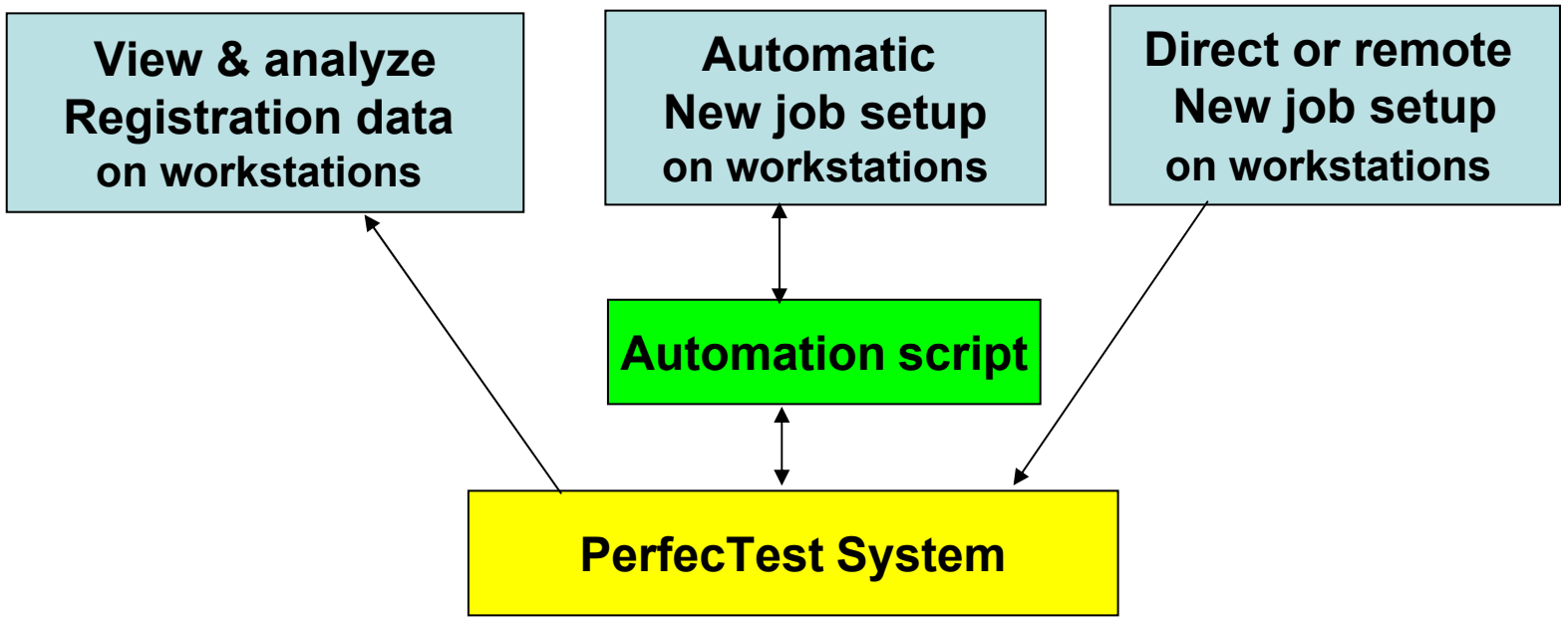
New job setup. Automated search for correct scaling factor

perfecTest®

Remote Access

Precise registration data is instantly available when it is needed & where it is needed.

Precise or *best-match* scaling data is easily imported when new jobs are being configured.



perfecTest®