



**DEK** 

ASM 

# VectorGuard<sup>®</sup> High Tension

Message to Market

## Presentation Overview

- Comparison of Mesh Mount Vs VectorGuard<sup>®</sup>
- Why is tension so important?
- Introducing VectorGuard<sup>®</sup> High Tension
- Performance review
- Reminder of benefits of VectorGuard<sup>®</sup> system
- Additional benefits of VectorGuard<sup>®</sup> High Tension system

## Stencil Tension Review

### Mesh Mounted Stencils

- Fabric meshes stretch to 28-32 N-cm
- Stainless Steel meshes stretch upwards to 50+ N-cm
- Tension potentially is not transferred evenly after foil is glued in place and mesh is cut away
- Difficult to measure tension after foil mounting, industry typically looks at deflection
- Glue bonds of mesh to frame and foil can fail over time
- Mesh can stretch over time
- Inconsistent printing and poor print definition over the life of the stencil
- Distortion of frame

## Stencil Tension Review

### Vector Guard ®

- Foil tension 33 N-cm
- Tension transferred evenly on all four sides
- No glue bonds to fail
- Consistent tension for a longer period of the stencil life
- Frame flatness for process control
- Repeatability of position from foil to foil of same product (Reduced time to switch stencil)

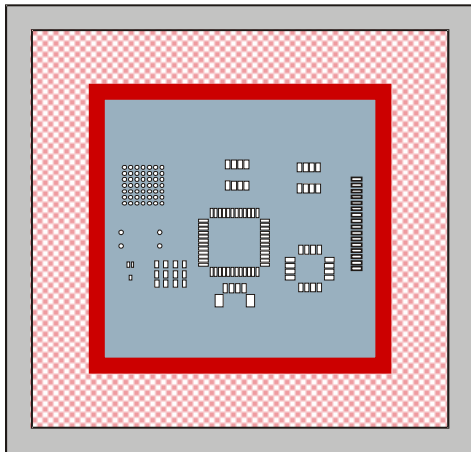
## The Importance of Tension

Loss of tension contributes to:

- Greater deflection
- Inconsistent alignment
- Non-uniformed separation of stencil from board causing:
  - Poor print definition
  - Peaking, “Dog Ears” or castle shaped deposits (raised edges around solder paste brick)
  - Inconsistent volume measurements, i.e. much greater than theoretical expected volumes
  - Potential source for bridging and solder balls
  - Insufficient print on sub 250 Micron apertures

# The Importance of Tension

Mesh Mounted Stencil



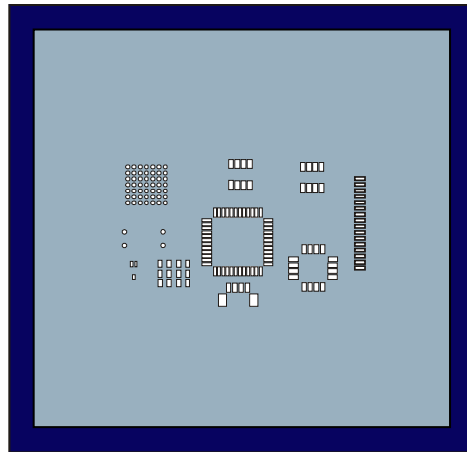
Squeegee- side



High deflection



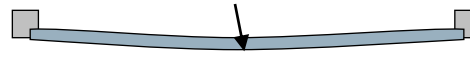
VectorGuard Stencil



Squeegee- side



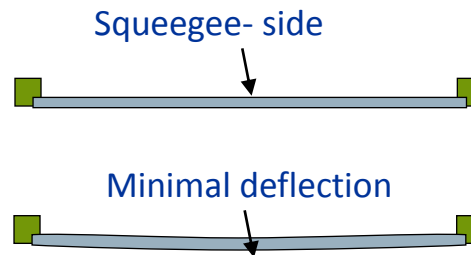
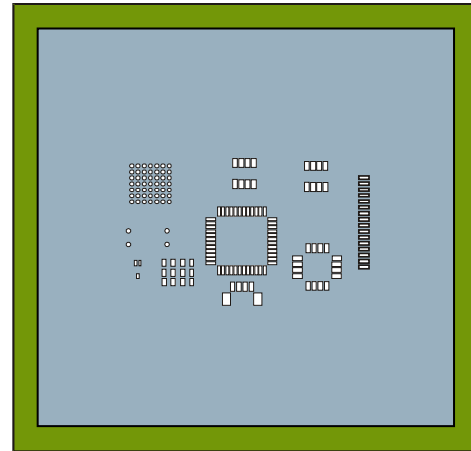
Moderate deflection



# Introducing - VectorGuard® High Tension System

- Foil Tension to 47\* N-cm
- Tension transferred evenly on all four sides
- No glue bonds to fail
- Consistent tension for the life of the stencil
- More uniform stencil release from the substrate, yielding better defined solder paste deposits and minimal peaking

VectorGuard High Tension Stencil



\* As measured by the Fraunhofer ISIT . using strain gauges attached to a VG blank foil

## Performance Review of VectorGuard® High Tension System

- Leading automotive manufactures compared the performance of the Standard VG frame and High Tension VG frame.
- SPI data for Volume, Height and Area Transfer efficiency for mixed components.
  - 0603
  - QFP
  - TSOP
  - CSP

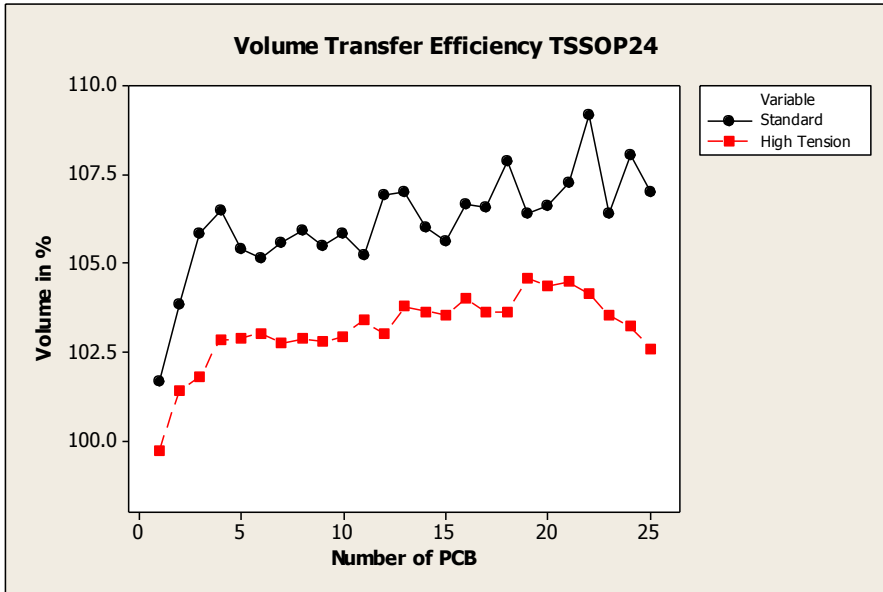


## Performance Review of VectorGuard® High Tension Frame - Results

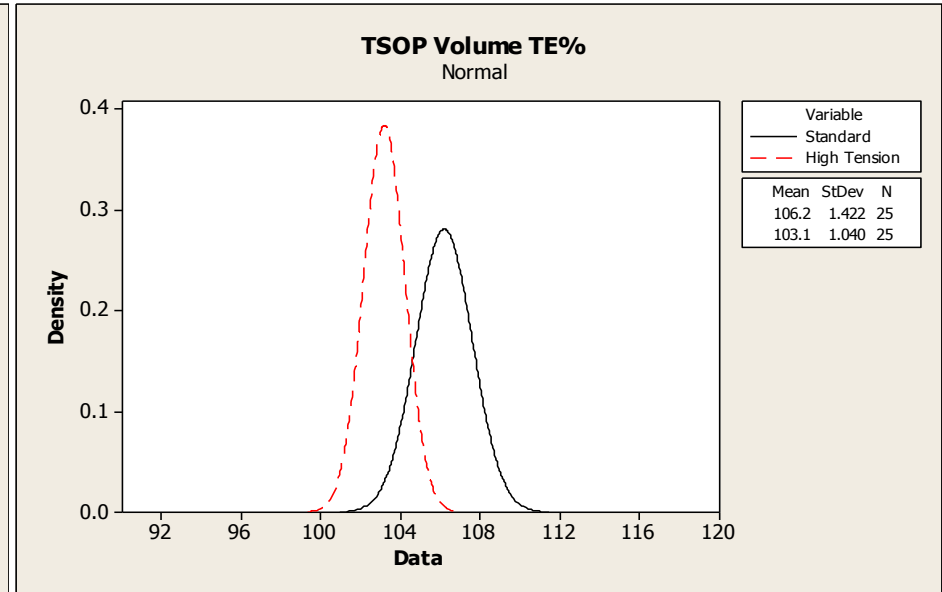
### Test results showed:

- Greater process control on the Vector Guard® High Tension frame
- More aligned volume transfer efficiency for the target
- Less area coverage on the QFP apertures (especially direction NS) – Same volume
- This resulted in higher yield with less rejects ( less frequent bridging, solder balling)
- More repeatable process with the lifetime of the stencil
- Lower sensitivity to squeegee pressure during the print strokes

# Example of results on TSOP components



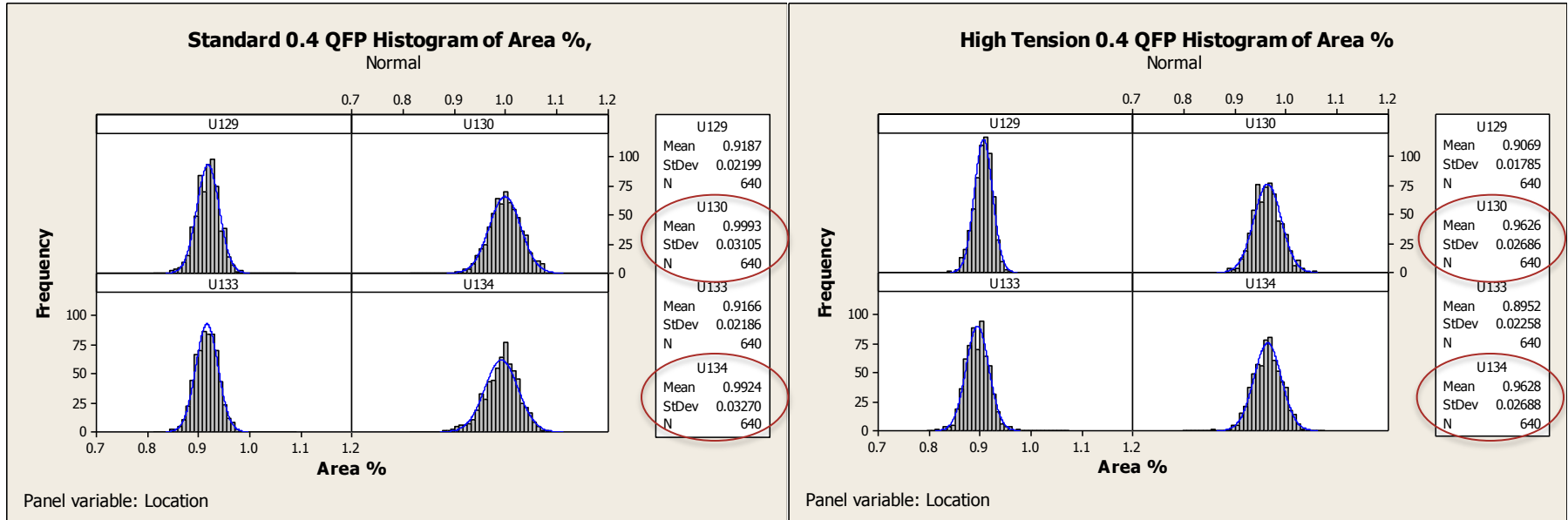
Standard Deviation Chart



Histogram of VTE% on TSOP24

1. Chart LHS represents the average VTE% of each sampled PCB.
2. Chart RHS showing the average mean of the VTE% and its standard deviations.

# Example of results on QFP component



Graphs shows the 0.4 QFP Area Transfer Efficiency and its Standard Deviations.

Four charts plotted for two QFP locations.

U129-U130 = QFP1

U133-U134 = QFP2

Aperture direction:

U129-U133 → EW direction

U130-U134 → NS direction

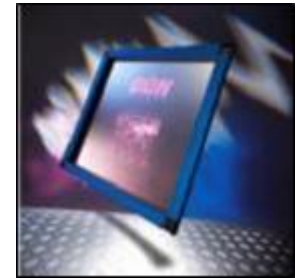
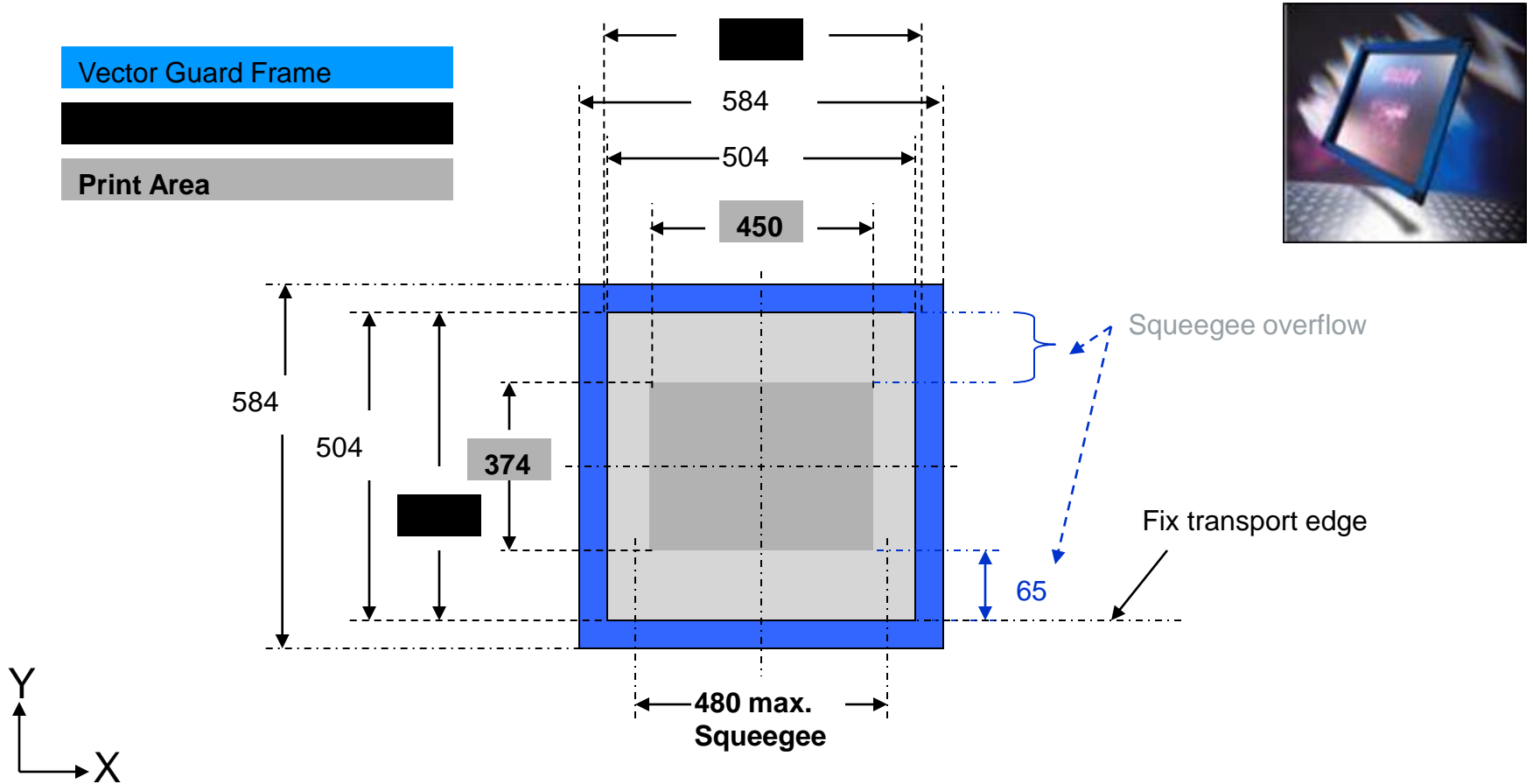
Area coverage on NS direction of the QFP apertures showed less paste coverage which means less chance for bridging and lower Standard Deviation for a robust process.

## What are the benefits of the VectorGuard® System

- Space
- Safety
- Ease of use
- Positional accuracy
- Flatness

**23 X 23 VectorGuard provides the same print area as a 29 X 29 Mesh Mount**

Vector Guard 584 x 584 (23x23")



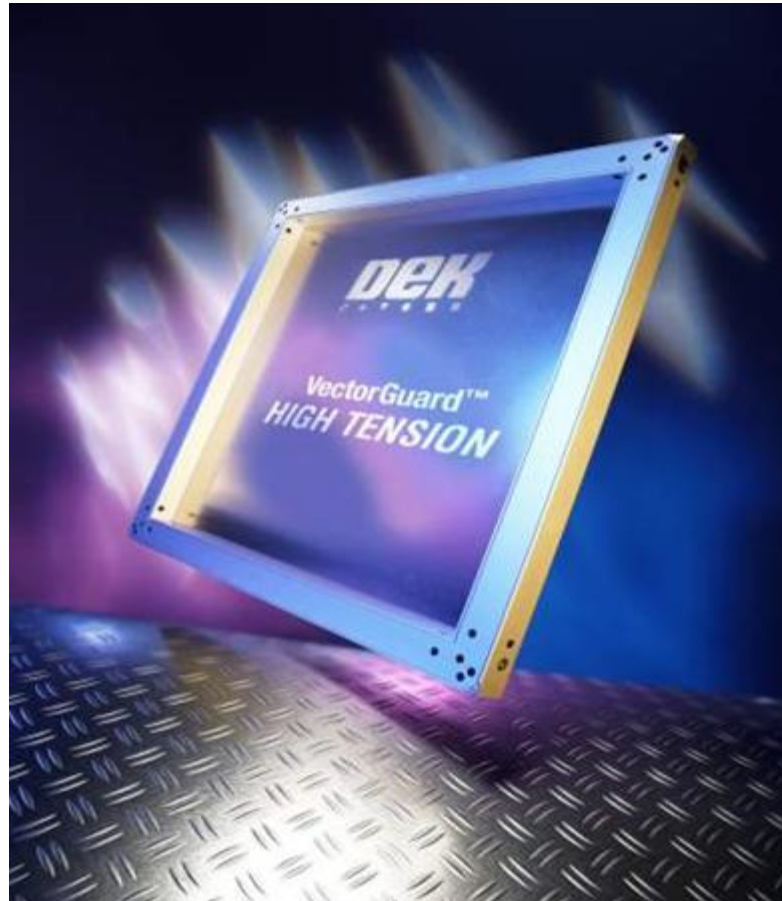
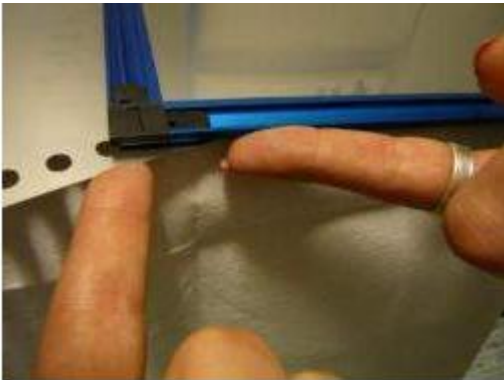
**Print Area: max 450x374 mm; Squeegee: max.480mm; USC: max.400mm  
PCB: max. 510 x 508mm**

## 650 VectorGuard Stencils !



## Customer Efficiency

- Customer Efficiency
- Easy to load
- Safe for operators
- Reduced storage



# Positional Accuracy and Consistency

## Planarity of frame

The tubular welded frames are more susceptible in terms of warpage. (see right)

## Warp due to mesh tension and welded frames

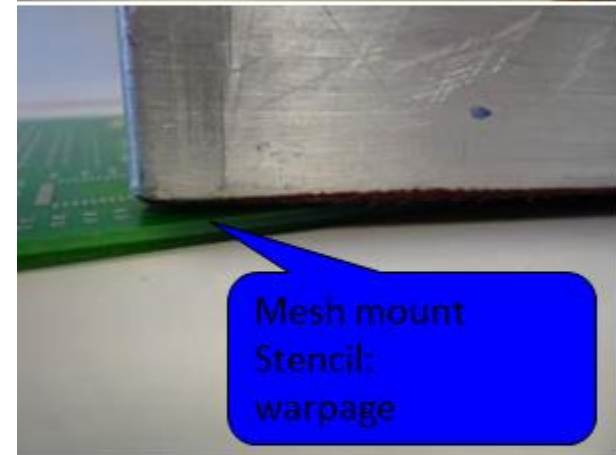
- No mesh and no welds in a VectorGuard® Frame

## Glue build up on edges of frame

## Benefits to customers

## Consistency board to board and lot to lot

Resolve the root cause of the failures instead of the symptom of the Mesh mounted drawbacks by using VectorGuard®



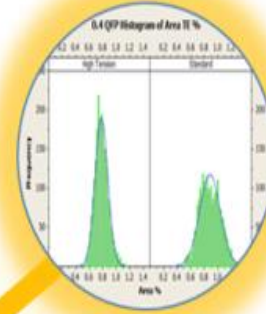
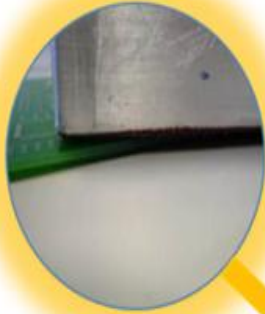
Vector Guard  
Stencil:  
Flat and planar



## VectorGuard® High Tension Value Proposition

- Improved process control for greater end-of-line yield
- Better transfer efficiency over the life of the stencil for leading-edge, miniaturized components
- Excellent solder paste deposition definition
- Long-term integrity with no tension degradation over time
- Compatibility with existing Vector Guard® foils for cost-effective process integration
- The system is available now in frame size 23 By 23 part number 800023

# Vector Guard<sup>®</sup> High Tension





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