**Fine Line Stencil™**

Launched in 2013, DEK’s brand new Fine Line Stencil™ technology will make a major impact on the PV industry, enabling its users to lower their manufacturing costs, and produce more efficient solar cells.

Having worked extensively with PV manufacturers to understand their print process needs, DEK Solar has developed this brand new technology to enable ultra fine line solar cell metallisation.

Reducing screen printed line width helps reduce shadowing losses, but can also lead to higher line resistance. However, DEK Solar’s Fine Line Stencil™ ensures superb printed line height uniformity. This gives excellent line conductivity with almost no wasted silver, thereby producing sub-40µm line widths with no increase in line resistance.

When used in the dual print process, the Fine Line Stencil™ also creates a win-win scenario of higher efficiencies and lower silver consumption by firstly printing the busbars with a fine mesh screen, and then separately printing the conductors with the Fine Line Stencil™. This allows an optimised paste to be used for each print process. Precise control over the relative print height of the busbars and the fine lines saves silver, but also allows a non-contacting busbar paste to increase open circuit voltage (Voc) and therefore cell efficiency.

In testing, Fine Line Stencil™ has been proven to deliver:

- A relative increase in cell efficiency of more than 0.5% for dual print in comparison to the industry standard single screen print process
- Printing of front side grids with 40µm fingers, resulting in reductions of silver paste deposits of up to 40%, and an absolute value of <85 mg/cell

**Figure 1:** In testing, Fine Line Stencil™ has been proven to deliver a relative increase in cell efficiency of more than 0.5% for dual print in comparison to the industry standard single screen print process.

**Figure 2:** In tests which emulated standard industrial processes, Fine Line Stencil™ made it possible to print front side grids with 40µm fingers, resulting in reductions of silver paste deposits of up to 40%.
Frequently Asked Questions

Q: What is the thinnest line I can print using Fine Line Stencil™?
A: Laboratory work has seen DEK printing front side grids with fingers less than 30µm in width. Recent tests in a production environment using standard production tools have also produced front side grids with fingers only 36µm in width.

DEK continues to conduct research into the dual print process as the requirement for narrower printed line widths continues to grow.

Q: What are the paste requirements for this process?
A: There are numerous standard commercially available pastes that can be used with this process and we recommend that you consult your paste vendor regarding products suitable for stencil use.

Q: What stencil frame sizes are supported?
A: Stencils of any standard size from 355 x 355 mm and larger can be supported. However, if you have special requirements please contact us for further advice, and we will be happy to support you.

Q: Can I use Fine Line Stencil™ with printers other than DEK?
A: Yes, Fine Line Stencil™ can be used with printers other than those manufactured by DEK.

Q: Where can I purchase Fine Line Stencil™?
A: Fine Line Stencil™ can be purchased directly from DEK’s manufacturing operation in Singapore by contacting electroform@dek.com. Further details can be found at www.dekpssp.com.

Q: What is the lifetime of the stencil?
A: In DEK’s experience, you can expect the Fine Line Stencil™ to have a useful working life of 10,000 to 20,000 print cycles. DEK is also currently conducting a series of high volume test programmes, and will release the outcomes of these in the near future.

Q: Will my process engineers require any special training?
A: Using Fine Line Stencil™ results in very few differences in the printing process. The only additional knowledge required is an awareness of the process parameters and a few points on housekeeping.

For further information contact:

Tom Falcon
Email: tfalcon@dek.com
Tel: +44 1305 760760

Or

Andrew Zhou
Email: AndrewZhou@dek.com
Tel: +86 138 1812 8850