

Sunwire® News

The newsletter for Luvata's Sunwire photovoltaic wire

www.luvata.com/sunwire-news



Simplifying logistics



By Michael Nordgren

Lately there has been a lot of attention towards the role of supply chain management (SCM) and logistics within the solar industry. This is important when you compare that half of the energy from every barrel of oil will be used to extract and distribute

the energy from the other half. I know we can do better.

With the exponential growth of the solar industry, so too is the complexity of SCM and logistics. Misunderstanding terms of sale and delivery, port strikes, customs duties and tariffs, fluctuating currencies or even lost or damaged freight are just a few factors

that can have serious repercussions on customer satisfaction, let alone profit or loss.

As we look to enable economies of scale and drive continued reductions in the solar value chain, it's also an opportunity to consider sustainable solutions. Perhaps even give rise to green logistics. Green logistics looks to minimize the environmental impact of logistic activities. This includes the forward and reverse flow of products, information and services from the beginning, to the point of consumption and even disposal.

With four Sunwire manufacturing facilities on three continents, Luvata has chosen to be close to our customers. As a result, we're able to offer shorter lead times and quicker responsiveness, without many of the complexities mentioned above. This is addition to the exact same consistent quality that Sunwire customers around the world have come to expect.

Could solar ribbon optimization be constrained by module materials?

By Susan Porter

A recent study performed by the International Solar Energy Research Center (ISC) in Konstanz, Germany looked to determine the impact of solar ribbon thickness to measure the reduction in cell to module (CTM) losses in combination with varying width, thickness and yield strengths: soft, medium and hard.

CTM losses can exceed 5% and more mainly driven by electrical losses in the solar ribbon. These losses can be reduced by alternative module concepts or by decreasing the resistance of the copper the copper ribbon with larger cross sections (thickness, width).

Input parameters for the study

- Yield strength:
50 MPa, 75 MPa and 90 MPa
- Thickness:
0.15 mm, 0.20 mm and 0.24 mm
- Width:
1.5 mm and 2.0 mm
- Manual and machine soldering
- Variation of cell type 6" multi-crystalline solar cells

Output parameters for the study

- Peel Strength
- Crystal damage
- CTM losses
- Power loss after thermal-cycling (TC)

Results

The study demonstrates that electrical losses can be reduced by more than 20% for ribbon of 0.20 mm thickness and 30% for ribbon of 0.24 mm thickness compared to standard 0.15 mm thick ribbon.



Sunwire white high-output PV wire

Peel strength is improved using softer ribbon and the cell type (metallization paste, wafer quality and heat treatment) has the most significant effect on Pmpp losses after thermal-cycling, being reduced only by softer ribbon. The soldering method, manual or machine, had no influence on power losses. While larger ribbon thickness and width leads to higher stress magnitudes, stresses to the silicon during soldering are strongly dependent on the yield stress of the ribbon.

“There were clear gains using super-soft solar ribbon Sunwire,” indicates Dr. Andreas Schneider, Director Module Development with ISC. “However when the thickness of the softer ribbon was increased, Pmpp losses tend to increase after climatic testing: after lamination and 200 cycles of thermal-cycling, the influence of the ribbon yield

stress is less significant compared to the ribbon geometry due to the restrictions given by module sandwich materials (in first order EVA thickness and stress caused by glass).”

Summary

The study clearly demonstrates that yield strength, thickness and width of solar ribbon can directly influence production yields and decrease CTM losses by 20-30%. “However since most of the damage after soldering in the cell structure is only visible after lamination and thermal-cycling, the ribbon width and thickness have to be carefully adapted to accommodate the limitations of the module materials,” summarizes Dr. Schneider. “It now makes me wonder what gains could be achieved by simply increasing the ethylene-vinyl acetate (EVA) thickness by 100 microns.”

Meet a Sunwire Team Member



Name: **Leah Janowski**, Process Engineer with Luvata Appleton

While in college, I started as a Luvata Appleton intern working on different projects. After graduating from the University of Wisconsin in Material Science and Engineering in 2012, a position opened up in Appleton and I've been working as a process engineer, supporting the manufacture of Sunwire, for over two years now.

What is the best part about your job?

Each day is different and something new always pops up. I enjoy problem solving and love working with the people around me.

What is something not many people know about you?

A hand-written thank you note is what got me to where I am today. I asked a professor for a letter of recommendation for a study abroad program. Although I didn't get into the program, I wrote the professor a thank you note anyway. He told me I was only one of a few other students that did such a thing in his career. He was so impressed he told me he would help find me a good summer internship. He introduced me to Luvata Appleton and set me on my current path.

What are a few of your hobbies?

I enjoy biking, hiking and photography.

What are three items you can't live without?

Lip balm, fast internet and my family.

Do you have a hidden or secret talent?

I'm a pretty good cook. My mom taught me and now I generally don't even need a recipe. I can usually throw things together into a great meal.

An advertisement for Sunwire photovoltaic wire. The background is a close-up of several layers of curved, metallic-looking wire. The text is overlaid on the left side of the image.

The flattest,
straightest,
softest

Sunwire® photovoltaic wire

www.luvata.com by LUVATA

Luvata Sunwire®

Luvata, an early pioneer in the photovoltaic industry, manufactures solar ribbon branded Sunwire®. Sunwire is compatible with both thin film technology and crystalline silicon and is used as both an interconnecting ribbon and a cross-connecting ribbon.

By implementing identical processes at all four of its Sunwire facilities, this enables Luvata to manufacture exactly the same product with the same consistent quality, along with local customer service and technical support.

6,300 employees
36 production facilities
17 countries



Luvata Sunwire® Manufacturing Facilities:

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- Luvata Malaysia Sdn Bhd**
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Go to www.luvata.com/sunwire-news for the online version of this newsletter.

Upcoming Events

2015

- June 10-12 **InterSolar Europe 2015**, Munich, Germany www.intersolar.de/en/intersolar-europe.html
- Sept 15-17 **EU PVSEC 2015**, Hamburg, Germany www.photovoltaic-conference.com/
- Sept 23-25 **9th Renewable Energy India Expo**, Greater Noida, India www.ubmindia.in/renewable_energy/home