

## **Task Group 1: PV QA Guideline for Manufacturing Consistency**

### **Status**

Dr. Ivan Sinicco – Head of Module Technology

**International PV Module QA Forum Meeting**

Hamburg – 8<sup>th</sup> of September 2011



## **Proposed scope Task Force 1:**

Reliability and durability of a PV module is a good balance between material properties and process control.

**Verify** and **maintain** quality during manufacturing is essential to reduce the risk of failures in the field (probably „THE“ contributor of „infant and useful life mortality“).

*Scope of this task force is to design guidelines to cover this "missing point" in the actual PV standards.*

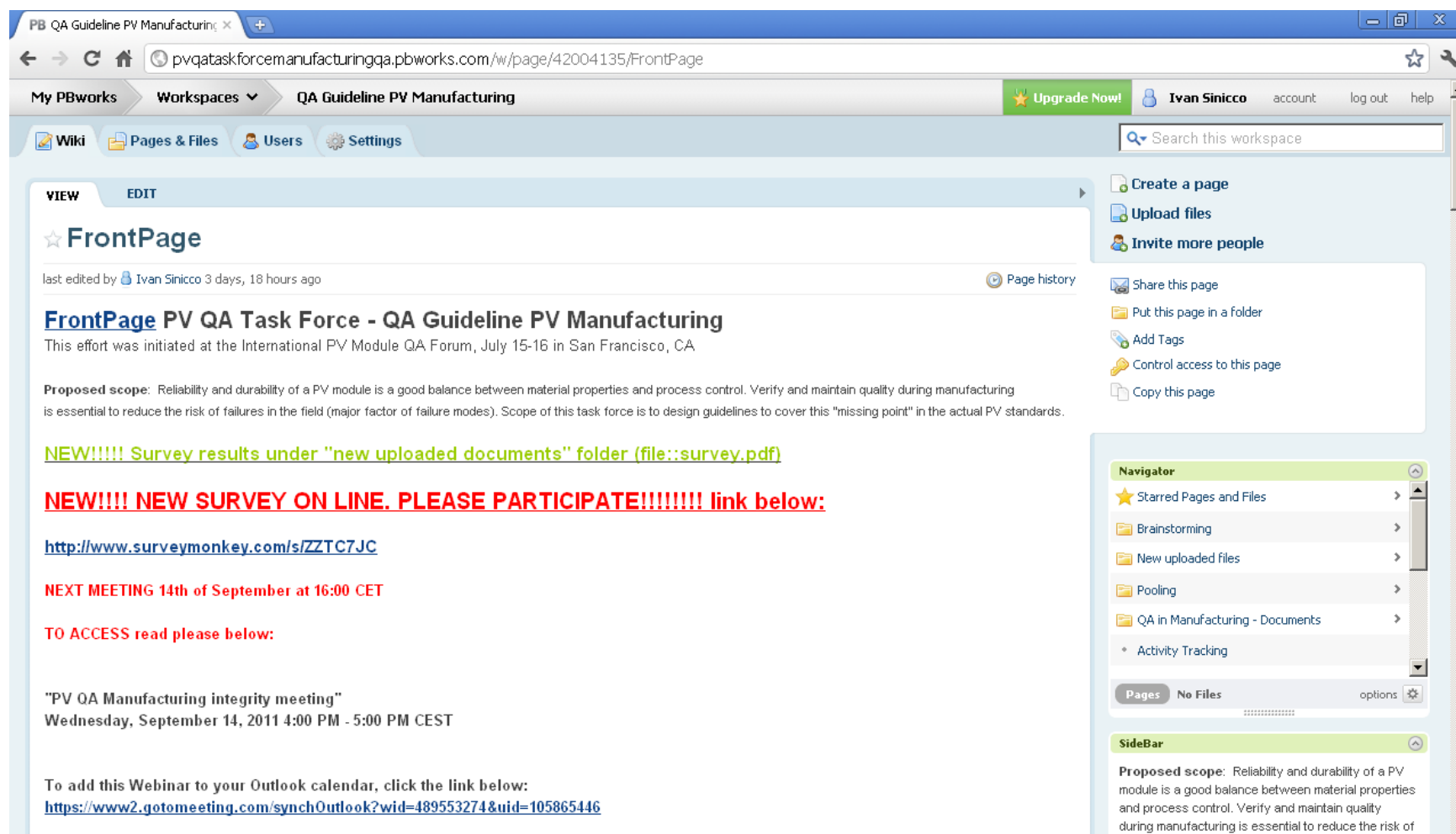
# Participants total (stand 02/09)

Italy	Germany	USA	JP	China	Switzerland	Canada
1	6	34	3	3	1	1

Total: 50

Established a webpage for documents/opinions exchange:

<http://pvqataskforcemanufacturingqa.pbworks.com>



The screenshot shows a web browser window displaying a PBworks page. The browser address bar shows the URL: [pvqataskforcemanufacturingqa.pbworks.com/w/page/42004135/FrontPage](http://pvqataskforcemanufacturingqa.pbworks.com/w/page/42004135/FrontPage). The page title is "FrontPage PV QA Task Force - QA Guideline PV Manufacturing". The content includes:

- A "Proposed scope" paragraph: "Reliability and durability of a PV module is a good balance between material properties and process control. Verify and maintain quality during manufacturing is essential to reduce the risk of failures in the field (major factor of failure modes). Scope of this task force is to design guidelines to cover this "missing point" in the actual PV standards."
- A green link: [NEW!!!! Survey results under "new uploaded documents" folder \(file::survey.pdf\)](#)
- A red link: [NEW!!!! NEW SURVEY ON LINE. PLEASE PARTICIPATE!!!!!!! link below:](#)
- A blue link: <http://www.surveymonkey.com/s/ZZTC7JC>
- A red text: **NEXT MEETING 14th of September at 16:00 CET**
- A red text: **TO ACCESS read please below:**
- A text block: "PV QA Manufacturing integrity meeting" Wednesday, September 14, 2011 4:00 PM - 5:00 PM CEST
- A text block: "To add this Webinar to your Outlook calendar, click the link below:" followed by a blue link: <https://www2.gotomeeting.com/synchOutlook?wid=489553274&uid=105865446>

The right sidebar contains a "Navigator" section with a list of folders: "Starred Pages and Files", "Brainstorming", "New uploaded files", "Pooling", "QA in Manufacturing - Documents", and "Activity Tracking". Below the navigator is a "SideBar" section with a "Proposed scope" paragraph: "Reliability and durability of a PV module is a good balance between material properties and process control. Verify and maintain quality during manufacturing is essential to reduce the risk of the risk of".




## 26% Never visit the webpage

Italy	Germany	USA	JP	China	Switzerland	Canada
	1	8		3	0	1

Problems to access webpage

First task force meeting (via web) scheduled: 14th September 16:00 CET

First survey on ISO requirements that fits to scope: Done (participation 30%)

Survey Title <small>Sort</small>	Created <small>Sort</small>	Modified <small>Sort</small>	Design	Collect	Analyze <small>Sort</small>	Actions
<b>Guideline initial structure</b>	September 2, 2011 4:58 AM	1 day ago				10 <a href="#">Clear</a> <a href="#">Transfer</a> <a href="#">Delete</a>
<b>Measuring, Analysis &amp; Improvement</b>	August 4, 2011 12:59 PM	14 days ago				14 <a href="#">Clear</a> <a href="#">Transfer</a> <a href="#">Delete</a>
<b>Resource Management</b>	August 4, 2011 12:49 PM	14 days ago				14 <a href="#">Clear</a> <a href="#">Transfer</a> <a href="#">Delete</a>
<b>Product Realization</b>	August 4, 2011 12:53 PM	25 days ago				12 <a href="#">Clear</a> <a href="#">Transfer</a> <a href="#">Delete</a>
<b>Management Responsibility</b>	August 4, 2011 12:42 PM	25 days ago				13 <a href="#">Clear</a> <a href="#">Transfer</a> <a href="#">Delete</a>
<b>Quality Management System</b>	August 4, 2011 12:02 AM	25 days ago				14 <a href="#">Clear</a> <a href="#">Transfer</a> <a href="#">Delete</a>

- Second survey on the structure of the guideline: On going (participation till now 20%)

## Next Actions

1. Encourage other nations to be part of
2. Split the task force in sub task forces
3. Increase ACTIVE participation of the members by delegating activities

Goal:

Guideline structure by February 2012 (Ispra meeting)

## Task Group 2 Thermal and Mechanical Fatigue Including Vibration

- Leader
  - Chris Flueckiger
- No presentation available for the meeting

## Task Group 3 Humidity, Temperature and Voltage

- Co-chairs
  - John Wohlgemuth, NREL
  - Neelkanth Dhere, FSEC
- Signed up so far – 10
- Have not done any recruiting for members yet
- Will schedule first conference call for week of Sept 19.

## Task Group 3 Humidity, Temperature and Voltage

- Do not plan to propose just increasing the time at 85/85.
- Plan to model the moisture ingress into various types of modules in different climates (humid/dry)
- Will likely have to evaluate the humidity/temperature dependence for different module constructions in different ways.
- Look for ways to pre-stress certain constructions (e.g. edge seals) before damp heat exposure.
- Peter Hacke is planning to propose a draft of a voltage/humidity test at the WG2 meeting in Montreal Sept 26-30.



## Task Group 4 Diode, Shading & Reverse Bias

- Team Leaders: Vivek Gade (Jabil) and Paul Robusto (Intertek)
- Proposed Scope: There is increasing evidence that shading or other non uniformities in modules puts localized stress that can lead to overheating, and, in some cases, to fires. Not only is this failure a serious safety issue, but there is some evidence that aging modules show increasing non uniformity, implying that this may turn out to be a significant wear out mechanism. The details of the stresses that lead to these failures are not well understood but may be related to shading (and reverse bias operation associated with shading or other situations), high temperatures, and lightning. Thermal cycling may also be important since thermal fatigue failures can cause stress on the diodes. Intent is also to fill up gaps in current test standards and suggest tests that closely relate to field failure mechanisms.

## Task Group 4 Diode, Shading & Reverse Bias

- We need more team members
- Current Team Members:
  - Vivek S. Gade, Jabil, [vivek\\_gade@jabil.com](mailto:vivek_gade@jabil.com)
  - Paul Robusto, Intertek, [paul.robusto@intertek.com](mailto:paul.robusto@intertek.com)
  - -----
  - Kent Whitfield, Solaria
  - Samir Sharma, Uni-Solar
  - Jenya Meydbray, PV Evolution Labs
  - John Chiem, Diodes Incorporated
  - Bisrat Yohannes, Diodes Incorporated
  - Jos Van Loo Diotec, Semiconductor AG

# Task Group 5 UV, Temperature and Humidity

Task-Group coordinated by

Michael Köhl, Fraunhofer ISE, Germany

September, 2011

## Status, Needs and Approach

- ❑ Location dependent UV-stress under operation is not known.

=> simultaneous temperature, humidity and UV needs to be monitored for different climatic locations, installations, module components

- ❑ PV Module QA does not take into account the stresses caused by UV appropriately in the frame of the IEC type approval testing

=> new standards are needed

- ❑ Test conditions (including suitable artificial UV radiation sources) are not sufficiently defined

=> new standards are needed

## Needs and Approaches

- ❑ Investigation of degradation processes caused by UV and humidity
  - ⇒ Find appropriate models for ALT procedures
- ❑ Recommend suitable artificial UV radiation sources
  - ⇒ set-up procedure for the evaluation of spectral distribution
- ❑ Proposal for Accelerated Life Testing
  - ⇒ For testing components, model modules, complete modules
  - ⇒ By combined humidity/UV tests or by sequential testing
- ❑ **More Task-force members are welcome**  
([michael.koehl@ise.fraunhofer.de](mailto:michael.koehl@ise.fraunhofer.de))