

North America Metrics Technical Committee Chapter Meeting Summary and Minutes

N.A. Standards Meetings at SEMICON West 2014

Wednesday, July 09, 2014

2:00 PM – 5:00 PM PDST

San Francisco Marriott Marquis Hotel in San Francisco, California

Next N.A. Metrics TC Chapter Meeting

The next N.A. Metrics TC Chapter Meeting is tentatively scheduled for November 5, 2014 at SEMI Headquarters in San Jose, California in conjunction with the N.A. Standards Fall 2014 Meetings. See § 9 of these minutes for full tentative schedule of all N.A. Metrics standards meetings. Exact meeting date and details will be announced when finalized and available at <http://www.semi.org/en/node/50511>.

Table 1 Meeting Attendees

Cochairs: David L. Bouldin (Fab Consulting), Mark Frankfurth (Cymer)

SEMI Staff: Michael Tran

<i>Company</i>	<i>Last</i>	<i>First</i>	<i>Company</i>	<i>Last</i>	<i>First</i>
BestESD Technical Services	Kraz	Vladimir	Industry Consultant	Rist	Lance
Consultant	Busing	David	Intel	Steven	Meyer
Cymer	Frankfurth	Mark	Tokyo Electron	Mashiro	Supika
Electronics Workshop	Steinman	Arnie			
<i>Fab Consulting</i>	<i>Bouldin</i>	<i>David</i>	SEMI N.A.	Tran	Michael

Note: *Italics indicates virtual participants.*

Table 2 Leadership Changes

<i>Group</i>	<i>Previous Leader</i>	<i>New Leader</i>
Wait Time Waste TF	Jackie Ferrell - stepped down as TF coleader	

Table 3 Ballot Results

Passed ballots and line items will be submitted to the ISC Audit & Review Subcommittee for procedural review.

Failed ballots and line items were returned to the originating task forces for re-work and re-balloting.

#	<i>Details</i>	<i>TC Chapter Action</i>
5682	Revision to SEMI E168-0114, Specification for Product Time Measurement	Passed as balloted.
5683	Revision to SEMI E168.1-0114, Specification for Product Time Measurement in GEM 300 Production Equipment	Passed as balloted. Superclean.

Table 4 Authorized Activities

#	<i>Type</i>	<i>TF</i>	<i>Details</i>
5750	SNARF	Wait Time Waste TF	Revision to Add a New Subordinate Standard: Specification for Product Time Measurement for Material Control Systems to SEMI E168-XX14, Specification for Product Time Measurement <i>Awaiting publication of Document 5682</i>
5751	SNARF	Wait Time Waste TF	Revision to Add a New Subordinate Standard: Specification for Product Time Measurement for Transport Systems to SEMI E168-XX14, Specification for Product Time Measurement <i>Awaiting publication of Document 5682</i>

Note: SNARFs and TFOFs are available for review on the SEMI Web site at:

<http://downloads.semi.org/web/wstdsbal.nsf/TFOFSNARF>

Table 5 Authorized Ballots

There were no authorized ballots.

Table 6 New Action Items

<i>Item #</i>	<i>Assigned to</i>	<i>Details</i>
2014Jul#01	Michael Tran	To create ballot adjudication motion template slides to help the N.A. Metrics TFs and Chapter.
2014Jul#02	Vladimir Kraz and Michael Tran	To troubleshoot the conference calls for international participants or use another communication method with video for the next EMC TF meeting.
2014Jul#03	Vladimir Kraz and Michael Tran	To send new EMC TF members with copies of Standards they need to effectively participate.
2014Jul#04	Supika Mashiro	To look into an “E” document that’s related to AMHS.
2014Jul#05	Lance Rist	To look into a possible Standards Technical Education Program (STEP) for the Wait Time Waste documents (SEMI E168 and E168.x).

Table 7 Previous Meeting Actions Items

There was no previous meeting Action Items.

1 Welcome, Reminders, and Introductions

1.1 Mark Frankfurth (Cymer) called the meeting to order at 2:07 PM PDT. The meeting reminders on program membership requirements, antitrust issues, intellectual property issues, and holding meetings with international attendance were reviewed. Attendees introduced themselves.

Attachment: 01, SEMI Standards Required Meeting Elements

2 Review of Previous Meeting Minutes

2.1 The committee reviewed the minutes of the previous meeting from the N.A. Standards Spring 2014 Meetings.

Motion: To approve the minutes of the previous meeting from the N.A. Standards Spring 2014 Meetings as written.

By / 2nd: Lance Rist (Industry Consultant) / Vladimir Kraz (Best ESD Technical Services)

Discussion: None.

Vote: 6-0 in favor. Motion passed.

Attachment: 02, NA Metrics TC chapter Meeting Minutes (Spring 2014)

3 Liaison Reports

3.1 *Europe Equipment Automation Committee*

3.1.1 Michael Tran (SEMI N.A.) reported for the Europe Equipment Automation (Metrics TC Chapter) Committee. The key items were as follows:

- Last Meeting:
 - Oct 9, 2013 – SEMICON Europa 2013, in Dresden, Germany
- Next Meeting:
 - Oct 8, 2014 – SEMICON Europa 2014 in Grenoble, France
- SEMI Europe contact, Andrea Busch, abusch@semi.org

Attachment: 03, EU Equipment Automation (Metrics) Report (West 2014)

3.2 *Japan Metrics TC Chapter*

3.2.1 Supika Mashiro (Tokyo Electron) reported for the Japan Metrics TC Chapter. Supika mentioned there were currently no Japan Metrics-related activities going on.

3.3 *Technical Editors Board*

3.3.1 David Bouldin (Fab Consulting) reported for the Technical Editors Board. There were no meetings held since all the work was done through email. There is no update at the moment for the *Style Manual*, but the Board is collecting feedback for the next update. There are possible new revisions to the SEMI Standards *Regulations* and the *Procedure Guide* by SEMICON Japan 2014. Please forward all feedback to David Bouldin (david.bouldin@sbcglobal.net) and Shannon Austin (saustin@semi.org).

3.4 *Technical Architects Board*

3.4.1 Jackie Ferrell (SEMATECH) has retired and is no longer participating in the SEMI Standards Program. There was no update received.

3.5 *Electrostatic Discharge Association (ESDA) Liaison Report*

3.5.1 Arnie Steinman (Electronics Workshop) reported for the ESDA. The key items:

- ESD Industry Activities
 - ESDA and JEDEC are collaborating to release joint device test standards
 - They released The Human Body Model (HBM), which is available on the ESDA and JEDEC (www.jedec.org) Web sites
 - Possible collaboration with JEITA is being investigated
 - Work on the updated Charged Device Model (CDM) document is almost completed
- ESDA Web site (www.esda.org)
 - The following document are available for download on the ESDA Web site:
 - ANSI ESD S20.20 (Static Control Program)
 - ESDA Glossary of Terms
 - ESD Technology Roadmap for Device ESD Sensitivity
 - STM 5.1– Human Body Model
 - STM 5.2 – Machine Model
 - STM 5.3.1 – Charged Device Model
 - ESD Standards meeting last held April 4-6, 2014 in Tucson, Arizona/USA
 - Next Standards meetings will be held in September 4-12, 2014 in Tucson, Arizona/USA
 - Visit the ESDA Web site (www.esda.org) for more information

3.6 *North America Standards Staff Report*

3.6.1 Michael Tran (SEMI N.A.) gave the N.A. Standards Staff Report. The key items were as follows:

- Upcoming SEMI Global Events in 2014
 - SEMICON Taiwan
 - September 3-5, 2014 in Taipei
 - Strategic Materials Conference
 - September 30 – October 1, 2014 in Santa Clara, California
 - SEMICON Europa Plastic Electronics
 - October 7-9, 2014 in Grenoble, France
 - SEMICON Japan
 - December 3-5, 2014 in Tokyo
- Standards Workshop at SEMICON West 2014
 - Wafer Geometry Control for Advanced Semiconductor Manufacturing
 - Important developments and future needs in wafer geometry for advanced semiconductor manufacturing.
 - Presenters from IBM, Intel as well as key equipment companies.
 - Proposals discussed during this workshop will be considered for standardization by the Advanced Wafer Geometry TF under the Silicon Wafer Committee.
- Standards Update at SEMICON West 2014
 - Semiconductor Technology Symposium (STS) Session
 - Metrics Standards Activities Update
 - Topic: Challenges, Innovations and Drivers in Metrology
 - 3DS-IC Standards Activities Update
 - Topic: Embracing what's NEXT – Devices & Systems for Big Data, Cloud and IoT
 - TechXPOT Session
 - Facilities & Gases Standards Activities Update
 - Topic: Subcomponent Supply Chain Challenges for 10 nm and Beyond
 - Compound Semiconductor Materials Standards Activities Update
 - Topic: Disruptive Compound Semiconductor Technologies
 - SEMI Standards Publications Stats
 - April 2014 – June 2014
 - New Standards: 6
 - Revised Standards: 20
 - Reapproved Standards: 4
 - Withdrawn Standards: 0
 - Total SEMI Standards in portfolio: 909
 - Includes 106 Inactive Standards
- Upcoming NA Standards Meetings

- NA Standards Fall 2014 Meetings
 - November 3-6, 2014 in SEMI HQ in San Jose, California
- NA Standards Spring 2015 Meetings
 - (Tentative) March 30 – April 2, 2015 SEMI HQ in San Jose, California
- NA Standards Meetings at SEMICON West 2015
 - (Tentative) July 13-16, 2015 in San Francisco, California
- SEMI NA Standards staff contact: Michael Tran, mtran@semi.org

Discussion: None.

Attachment: 04, N.A. Standards Staff Report (West 2014)

4 Ballot Review

NOTE 1: TC Chapter adjudication on the ballots are detailed in the Audits & Reviews (A&R) Subcommittee Forms for procedural review. These A&R forms are available as attachments to these minutes. The attachment number for each ballot document is provided under each ballot review below.

#	Details	TC Chapter Action
5682	Revision to SEMI E168-0114, Specification for Product Time Measurement	Passed as balloted.
5683	Revision to SEMI E168.1-0114, Specification for Product Time Measurement in GEM 300 Production Equipment	Passed as balloted. Superclean.

Motion: Document 5682 passed TC Chapter review as balloted and will be forwarded to the A&R SC for procedural review.

By / 2nd: Lance Rist (Industry Consultant) / David Busing (Consultant)

Discussion: None

Vote: 6-0 in favor. Motion passed.

Attachment: 05, Procedural Review form for Document 5682

Motion: Document 5683 passed TC Chapter review as balloted and will be forwarded to the A&R SC for procedural review.

By / 2nd: Lance Rist (Industry Consultant) / Arnie Steinman (Electronics Workshop)

Discussion: None

Vote: 6-0 in favor. Motion passed.

Action item: 2014Jul#01, Michael Tran to create ballot adjudication motion template slides to help the N.A. Metrics TFs and Chapter.

Attachment: 06, Procedural Review form for Document 5683

5 Subcommittee and Task Force Reports

5.1 *Equipment Reliability, Availability, Maintainability and Productivity (RAMP) Metrics Task Force*

5.1.1 David Busing (Consultant) and Steve Meyer (Intel) reported for the Equipment RAMP Metrics TF. The TF is currently reviewing the publication proofs of Documents 5340 (SEMI E10 – Equipment Reliability, Availability and Maintainability) and Document 5341 (SEMI E79 – Equipment Productivity) before they are published.

5.1.2 The TF has no new or updated SNARFs or ballots in the future. They are only focused on developing technical education materials as prerecorded webinars of SEMI E10 and SEMI E79.

Attachment: 07, Equipment RAMP Metrics Task Force Report (West 2014)

5.2 *Equipment Training and Documentation (T&D) Task Force*

5.2.1 Michael Tran (SEMI N.A.) reported for the Equipment Training and Documentation (T&D) Task Force. Michael received an email from the TF leader, Mark Cohran (Intel) that there were no new TF activities.

5.3 *Electromagnetic Compatibility (EMC) Task Force*

5.3.1 Vladimir Kraz (BestESD Technical Services) reported for the EMC TF. The TF discussed the following items:

- Industry Activities
 - European EMC Directive Recast was published in April 2014 to align with the New Legislative Framework.
 - The ITRS roadmap includes information on EMI limit, which is worth looking at.
 - Upcoming ESD Symposium meeting dates:
 - ESD Symposium: September 7-12, 2014 in Tucson, Arizona/USA
 - ESD Symposium on Factory Issues: October 30-31 in Munich, Germany
 - IEEE EMC Symposium: August 3-8 in Raleigh, North Carolina/USA
- TF Discussions
 - There was good representation of the industry participating in the meeting: semiconductors (ST Micro); fiber optics (Finisar); disk drive (Seagate); electronic assembly (Bose); education (National University of Taiwan); equipment manufacturer (Cymer); industry consultant (BestESD).
 - The TF received and distributed examples of electromagnetic interference (EMI) occurrences in the manufacturing environment from different participants.
 - The TF presents a plan for the first step in creating a document for EMI control: Guide for EMI Measurements.
 - There was definite interest from Asia for such a document and having participants from Asia is a good thing.
 - The first document for letter balloting will not happen in time by Spring 2014 as there is a bit more work to be done.
 - There was a problem with the setup of the conference call as international participants could not communicate with each other well. Vladimir will work with SEMI to troubleshoot the problem or use another communication method before the N.A. Standards Fall 2014 Meetings.

Action item: 2014 Jul#02, Vladimir Kraz to work with Michael Tran to troubleshoot the conference call for international participants or use another communication method with video for the next EMC TF meeting.

Action item: 2014 Jul#03, Vladimir Kraz and Michael Tran to send new EMC TF members with copies of standards they need to effectively participate.

Attachment: 08, EMC Task Force Report (West 2014)

5.4 *Electrostatic Discharge / Electrostatic Charge (ESD/ESC) Task Force*

5.4.1 Arnie Steinman (Electronics Workshop) reported for the Electrostatic Discharge / Electrostatic Charge (ESD/ESC) Task Force. Arnie talked about having been the TF leader for 20 years and that he plans to step down in 2015. The TC Chapter asked him to try to recruit a new coleader as soon as possible to make a smoother transition. The TF discussed possibilities for new work and whether it should be postponed until 2016 when the documents will need to be updated. Of note:

- Issues to be addressed in the next update of E78 and E129
 - Including information in E78 and E129 on reticle sensitivity to electric fields developed for E163 – To be done earlier in the document so that it is easily accessible
 - Relationship between ESD device testing and ESD damage that occurs during manufacturing – new Related Information section presenting information about work at the ESD Association (ESDA)
 - New issues regarding Charged Board Event (CBE), Electrical Overstress (EOS), and Cable Discharge Events (CDE) - new Related Information section presenting information about work at the ESD Association (ESDA)
 - Add discharge current testing to E78 and E129 – alternative methods are being worked on by the ESDA and should be referenced
 - Can we add a recommended equipment list to E78 and E129? – A generic measurement equipment list could be added as a Related Information section
- Issues to be addressed in the next update of E163
 - Effect of equipotential bonding of Extremely Electrostatic Sensitive (EES) items during manufacturing – more information needs to be gathered regarding experiments that confirm this phenomenon
 - Devise a test method to define damage to devices that occurs when the package becomes tribocharged, when the device is equipotentially bonded without a discharge occurring. Electric field stress on components internal to the device. – No expertise or access to equipment to do this is currently available to the Task Force. Would need to happen at multiple sites to transition into a supported test method.
- Issues to be addressed in the next update of E43
 - ESD event monitoring techniques and limitations – a section to be added to E43 at the next update
 - Faraday FOUP measurements – the device has turned out not to be commercially viable
 - Discharge time effects – conductors vs. insulators – a section to be added to the next E43 update
 - Add a recommended generic equipment list to E43
 - Is there equipment available to make measurements on 450 mm wafers? - Such equipment may exist, but is of limited application at present. Section in next update of E43 might address the issue
- Communicating ESD control requirements between design, device fabrication, and device manufacturing or utilization – a possible document to survey worldwide efforts to increase communication between the producers and users of semiconductor devices

Attachment: 09, ESD Task Force Report (West 2014)

5.5 Wait Time Waste (WTW) Task Force

5.5.1 Lance Rist (Industry Consultant) reported for the WTW TF. Jackie Ferrell (SEMATECH) has retired and stepped down as the TF coleader. The TF reviewed the ballot results for Document 5682 (Product Time Management) and Document 5683 (Product Time Management 300 GEM) and they both passed TC Chapter review as balloted. See § 4 of these minutes for ballot adjudication details.

5.5.2 The TF discussed the next topic of Wait Time Waste applied to Automated Material Handling Systems (AMHSs). Of note:

- There are three systems for AMHS with three interfaces:
 - Material Control System (to FICS/MES)
 - Transport (to MCS) – SEMI E82-based
 - Storage (to MCS) – SEMI E88-based
- The TF is working on applying Wait Time Waste to the first two to become SEMI Standards
 - The TF submitted two SNARFs which were approved by the TC Chapter (see § 7.1 of these minutes for details):
 - SNARF # 5750, Specification for Product Time Measurement for Material Control Systems
 - SNARF # 5751, Specification for Product Time Measurement for Transport Systems
- AMHS Opportunities
 - AMHS provides a beginning-to-end view of product
 - MCS → “low-resolution” view of full product lifecycle (SNARF # 5750)
 - We can then “zoom in” as needed
 - Datasets can be analyzed separately, but also can be merged
 - Our GEM 300 equipment view is an example of that (E168.1)
 - Transport system will provide a second detailed view (SNARF # 5751)
 - Other detail may be possible
 - Stocker messaging is simple, but provides some detail
 - Zero-footprint storage or non-E82 transport might have detail
- AMHS Differences for WTW
 - For example:
 - AMHS (MCS and Transport Systems) jobs are simpler
 - Fewer events
 - No transition from Lot to Substrate granularity
 - Many simultaneous jobs in the log
 - MCS likely to handle all lots in the factory (many, many messages)
 - Jobs focused on CarrierID
 - LotID is omitted from most AMHS logs – will need to add LotID from external (MES) source
 - Lots are handed-off among transport systems, stockers, equipment
 - MCS does not track lots within equipment or stockers

- Transport system logs add this detail
 - During transport, redirection is common
 - System may find destination is unavailable
 - MES may change destination

Action item: 2014 Jul#04, Supika Mashiro to look into an “E” document that’s related to AMHS.

Action item: 2014 Jul#05, Lance Rist to look into a possible Standards Technical Education Program (STEP) for the Wait Time Waste documents (SEMI E168 and E168.x).

Attachment: 10, Wait Time Waste Task Force Report (West 2014)

6 Old Business

6.1 5-Year Review Update

6.1.1 The TC Chapter looked at Documents needed for five-year review:

<i>Document #</i>	<i>Document Title</i>	<i>Status</i>
SEMI E79-1106	<i>Specification for Definition And Measurement of Equipment Productivity</i>	The publication proof is currently being reviewed.
SEMI E114-0302E (Reapproved 0309)	<i>Test Method for RF Cable Assemblies Used in Semiconductor Processing Equipment RF Power Delivery Systems</i>	Pending review.
SEMI E115-0302E (Reapproved 0309)	<i>Test Method for Determining the Load Impedance and Efficiency of Matching Networks Used in Semiconductor Processing Equipment RF Power Delivery Systems</i>	Pending review.

7 New Business

7.1 New SNARFs

7.1.1 The following SNARFs were submitted to the TC Chapter for approval:

<i>#</i>	<i>Type</i>	<i>TF</i>	<i>Details</i>
5750	SNARF	Wait Time Waste TF	Revision to Add a New Subordinate Standard: Specification for Product Time Measurement for Material Control Systems to SEMI E168-XX14, Specification for Product Time Measurement <i>Awaiting publication of Document 5682</i>
5751	SNARF	Wait Time Waste TF	Revision to Add a New Subordinate Standard: Specification for Product Time Measurement for Transport Systems to SEMI E168-XX14, Specification for Product Time Measurement <i>Awaiting publication of Document 5682</i>

Note: SNARFs and TFOFs are available for review on the SEMI Web site at:

<http://downloads.semi.org/web/wstdsbal.nsf/TFOFSNARF>

Motion: To approve SNARF # 5750

By / 2nd: Lance Rist (Industry Consultant) / David Busing (Consultant)

Discussion: None

Vote: 6-0 in favor. Motion passed.

Motion: To approve SNARF # 5751
By / 2nd: Lance Rist (Industry Consultant) / Arnie Steinman (Electronics Workshop)
Discussion: None
Vote: 6-0 in favor. Motion passed.

8 Action Item Review

8.1 Open Action Items

8.1.1 Michael Tran (SEMI N.A.) reviewed the open action items. These can be found in the Open Action Items table at the beginning of these minutes.

8.2 New Action Items

8.2.1 Michael Tran (SEMI N.A.) reviewed the new action items. These can be found in the New Action Items table at the beginning of these minutes.

9 Next Meeting and Adjournment

9.1 The next N.A. Metrics Standards Meetings are tentatively scheduled for November 3 – 5, 2014 at SEMI Headquarters in San Jose, California in conjunction with the NA Standards Fall 2014 Meetings. Exact meeting date and details will be announced when finalized and available at <http://www.semi.org/en/node/50511>

Tentative Schedule

Monday, November 3*

- Wait Time Waste TF (3:00 PM - 6:00 PM)

Tuesday, November 4*

- Equipment T&D TF (9:00 AM – 12:00 PM Noon)
- ESD/ESC TF (1:30 PM – 3:30 PM)
- EMC TF (5:00 PM – 7:00 PM)

Wednesday, November 5*

- Equipment RAMP Metrics TF (9:00 AM – 12:00 PM Noon)
- N.A. Metrics TC Chapter (2:00 PM – 5:00 PM)

*All times are in Pacific Time. Times and dates are subject to change without notice.

9.2 Having no further business, the N.A. Metrics TC Chapter meeting in conjunction with the N.A. Standards Meetings at SEMICON West 2014 was adjourned at 3:19 PM.

Respectfully submitted by:

Michael Tran
Senior Standards Engineer
SEMI North America
Phone: 1-408-943-7019
Email: mtran@semi.org

Minutes approved by:

David Bouldin (Fab Consulting), Cochair	September 16, 2014
Mark Frankfurth (Cymer), Cochair	

Table 8 Index of Available Attachments #1

#	<i>Title</i>	#	<i>Title</i>
01	SEMI Standards Required Meeting Elements	06	Procedural Review form for Document 5683
02	NA Metrics TC Chapter Meeting Minutes (Spring 2014)	07	Equipment RAMP Metrics Task Force Report (West 2014)
03	EU Equipment Automation (Metrics) Report (West 2014)	08	EMC Task Force Report (West 2014)
04	N.A. Standards Staff Report (West 2014)	09	ESD Task Force Report (West 2014)
05	Procedural Review form for Document 5682	10	Wait Time Waste Task Force Report (West 2014)

#1 Due to file size and delivery issues, attachments must be downloaded separately. A .zip file containing all attachments for these minutes is available at www.semi.org. For additional information or to obtain individual attachments, please contact Michael Tran at the contact information above.