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Building SAWE Capability as an ANSI Accredited Standards Developer

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Acronyms

ANSI	American National Standards Institute
ASD	Accredited Standards Developer
ISO	International Organization for Standardization
Mil	Prefix for U.S. Military based: standards, handbooks and specifications
MPE	Mass Properties Engineering
OMB	Office of Management and Budget
PINS	Project Initiation Notification System
RP	Recommended Practice
SAWE	Society of Allied Weight Engineers
SDO	Standards Developing Organization
USSS	United States Standards Strategy
VCS	Voluntary Consensus Standard

Abstract

This paper presents a 2014 status of the Society of Allied Weight Engineers' process towards becoming an Accredited Standards Developer (ASD) under certification by the United States American National Standards Institute (ANSI). Included is material from the committee's 2013 International presentation, current status, and additional general background material. The document strives to serve as a reference point to assist SAWE Recommended Practice and Standards developers in negotiating United States Standards Strategy, international standards strategy, and the association of SAWE standards and recommended practices to those efforts. Required procedures for SAWE to develop and maintain Recommended Practices and ANSI/SAWE Standards are reviewed.

Introduction

Guiding modern standards development in the U.S. and Internationally is the feature of utilizing open voluntary consensus methods to develop best in class standards documents which support multiple and possibly conflicting interest categories [1]. This paper presents the procedures which the Society of Allied Weight Engineers (SAWE) has developed to implement a consensus process and become a United States Accredited Standards Developer (ASD) under certification by the American National Standards Institute (ANSI) [2]. To become an ASD, the soliciting organization must fulfill the principles and process requirements defined by ANSI as "ANSI Essential Requirements: Due process requirements for American National Standards" [3]. The SAWE-ANSI Accreditation committee has led the effort to define our

ANSI Essential Requirements over the past year. The committee was created by the SAWE Standards and Practices Chairman, and is composed of government, industry, and general members with particular interest in helping the SAWE to become an ASD. Committee work resulted in SAWE Technical Overview document TO-2, "SAWE Procedures as an Accredited Standards Developer with the American National Standards Institute" [4]. The TO-2 content as well as relevant ANSI, U.S., and International standards information is presented in this paper. This knowledge will enable general SAWE members, corporate members, and other interested parties to work in a consensus manner and efficiently create and maintain ANSI accredited Mass Properties Engineering (MPE) Standards. As an ANSI ASD, the Society also is poised to be able to develop International Standards through ANSI sponsored submission to the International Organization for Standardization (ISO). ANSI is the sole U.S. member body of ISO. We also note that the SAWE is an organization with a 74 year history, with many Recommended Practices (RP's) in use technically and contractually, and it is important for the SAWE to be able to continue to create and maintain these traditional products.

Note also that as this document is not subject to change as the SAWE/ANSI standards development policy will be, the SAWE Operations Manual and SAWE TO-2 shall be considered the most current reference sources for the society's procedures in maintaining Standards and Recommended Practices.

SAWE History in Standards and Recommended Practices

Since the formation of the SAWE in 1939 there has been a desire to derive among Mass Properties Engineers the best practices available to ensure quality transportation products. Initially in aviation, but by 1973 the commonality of best practices in weight engineering being discussed led to the inclusion of all aerospace, marine, and land vehicles. At this point the A in SAWE was changed from Aeronautical to Allied, recognizing this multi-industry common interest. As recently as 2011 offshore marine has been recognized as another distinct segment of the MPE field which requires standardized approaches to efficiently develop and operate equipment related to oil and natural gas production. In 1981 the SAWE formally adopted procedures for the development of Recommended Practices in MPE and made the development and maintenance of these documents part of its Operations Manual. Prior to 1995 there was considerable participation in standards work by government representatives, that work occurring under the organization of the SAWE Government/Industry (G/I) committee structure. G/I work often involved SAWE

membership working with the U.S. government to define and improve documents like Mil Spec's, Standards and Handbooks. In 1995 the U.S. government moved to a model where standards would be less prescribed by government policy and rather be based upon an industry consensus development process. This is called out in the National Technology Transfer and Advancement Act (NTTAA) of 1995, actually made law in 1996. Government's workers are now encouraged to participate in the consensus process by executive direction under OMB Circular A-119, "*Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities*". Under this model SAWE adopted appropriate Mil based standards and maintained them as SAWE Recommended Practices.

The United States Standards Strategy (USSS) continues to promote a Voluntary Consensus Standards (VCS) process and was modified from the prior named National Standards Strategy to emphasize the need for international participation. SAWE is well aligned with many principals the USSS outlines: We represent an engineering sector which requires standards activities, we represent multiple sectors in transportation, aerospace, and marine products, and we represent sector interests from product users, product producers, the industry vendor supply base, and general consumers. With our international membership, chapter organization and conference activities we also appropriately support the USSS goal that, "*The U.S. government and industry should strongly and visibly coordinate their work in international forums to promote the consistent interpretation and application of internationally recognized principles on standardization*". Indeed, government participation in the VCS process is recently being strengthened by proposed updates to OMB A-119 [5] which seek to: reinforce the preference for Voluntary Consensus Standards, provide additional federal guidance, prefer international and private sector conformity assessment as opposed to governmental, increase transparency, and reduce burden.

To assure the most effective SAWE participation in the increasing desire for non-governmental standards initiatives the Society had in 2012 become an ANSI organizational member and has in January of 2014 submitted procedures to ANSI to become an ANSI Accredited Standards Developer (ASD).

SAWE Relationship to National and International Standards Organizations

Numerous organizations make up the larger environment of responsible parties for standards development guided by the USSS. The National Institute of Standards and Technology (NIST) is charged under the NTTAA with the responsibility to "... *coordinate federal, state, and local*

technical standards and conformity assessment activities, as well as [coordinating with] those in the private sector" [6]. NIST provides information on the compliance of federal agencies with the NTTAA as well as links to pertinent U.S. standards regulatory items.

The SAWE is an organization with international membership but also a non-profit organization incorporated in 1941 under United States law. A major allied partner for any U.S. incorporated Standards Developing Organization (SDO) is the American National Standards Institute. ANSI is the author of the USSS and its roots go back as far as 1904. Through multiple organizational associations and common interest between industry and government a standards body was formulated to provide: "*an impartial national body to coordinate standards development, approve national consensus standards, and halt user confusion on acceptability.*" During the 1940's "*Nearly 1,300 engineers worked on special committees to produce American War Standards for quality control, safety, photographic supplies and equipment components for military and civilian radio, fasteners and other products.*" ISO was in fact itself formed in 1946 after these U.S. activities and those of 24 other countries formed the organization. In the U.S. in 1969 the official title of the American National Standards Institute was adopted. ANSI members are categorized as Company, Education, Government, International, and Organizational. SAWE is one of 336 organizational members of ANSI and there are approximately 226 ANSI Accredited Standards Developers (ASD's).

The ANSI website provides a great wealth of information to SAWE members and standards developers. There is an e-standards store, a search engine for standards, a portal for access to standards which are Incorporated By Reference (IBR), the USSS site, a library of member and public documents and other useful links. ANSI also publishes "Standards Action" where open information on standards creations and modifications are posted for public access. The SAWE procedure to become an ANSI ASD was published in the January 31st 2014 edition of Standards Action.

Current ANSI initiatives which impact SAWE activities include "Standards Boost Business" which reaches out to standards impacted corporations, government organizations and professional societies to encourage participation in VCS work. Of current interest also is that of providing position statements on OMB A-119, and in instituting the Incorporated By Reference (IBR) standards portal. Here standards developers may provide read only versions of their standards which are incorporated by reference into requirements set by the Code of Federal Regulations.

Participation in ANSI by SAWE is one way the society brings value to our individual and corporate memberships, providing those members the most current information and process states related to MPE standards. SAWE has a history nearly as long as the U.S. standards initiatives that pre-date ANSI, and we have provided the harmonizing function necessary to ANSI's goals of creating multi-organizationally accepted procedures as evidenced by our ongoing collaborative work with other SDO's, and our outreach through publications and training opportunities. Some examples of this outreach and collaboration include the SAWE contribution to the Wyle publishing "Handbook of Measurement in Science and Engineering" [7], and our formal work with professional societies in the Aerospace and Marine sectors. Currently such work includes improvements to standards for Mass Properties Control of Space Vehicles [8] and Recommended Practice updates for marine vehicle terminologies and mass control. SAWE members also added the Mass Properties special topic in Systems Engineering to the International Council on Systems Engineering, INCOSE Systems Engineering Handbook [9].

ANSI is also the official U.S. representative to the International Organization for Standardization, ISO. Each country has one ISO member body representation and one vote on ISO actions. For a professional society like SAWE to create an ISO standard we first have to be accredited to create an ANSI standard. If at the time of the creation or modification of an ANSI/SAWE standard the SAWE desires a standard to be submitted as an ISO standard that request is made through ANSI. Without ANSI accreditation the SAWE is still a Standards Developing Organization, however becoming accredited as an ANSI ASD increases SAWE's importance in the area of national activities in MPE, and notably at the international level as well.

ISO represents the primary organization SAWE wishes to interact with to promote best practices for MPE at the international level. SAWE members have often already participated in ISO activities through harmonization activities with other ANSI ASD's such as the American Institute for Aeronautics and Astronautics, or the American Petroleum Institute. Ideally we will strengthen our impact at the international level through the ANSI member body access. Additionally SAWE members meet through the year, virtually, at regional, and at International conferences. Technical interchange at these meetings can also result in common best practices being considered in the MPE inputs to international standards through international members who participate in their countries own respective ISO member body activities.

ISO has had another impact on SAWE and if you have been involved in recent creation or maintenance of a SAWE Recommended Practice (RP) you will be familiar with this impact. The concept of the multi-stage document state; Working Draft, Committee Draft, Public Draft, and Final, all stem from the ISO procedures for standards creation. This approach as we will discuss next is prevalent in both SAWE RP and the proposed SAWE/ANSI standards development process.

SAWE Recommended Practices

The SAWE operations manual, Sec. 5.2 "Recommended Practices" [10] documents the process which our Standards and Practices Committee (SPC) and associated Industry Committees use to create and maintain SAWE RP's. The SAWE will maintain this process concurrently with the proposed ANSI Standards processes. This makes it possible for the Society to maintain and create additional RP's under its own capability as a Standards Developing Organization (SDO) as well as eventually as an ASD create ANSI/SAWE standards for procedures which the society desires be promoted to such status. Industry committees currently working on RP's will see no change to their Recommended Practice activities as a result of SAWE efforts in attempting to become an ANSI ASD. It will be shown in the next section how SPC industry committees are integrated with the proposed SAWE/ANSI standards process.

The operations manual procedures for creating RP's are stated below as a quick reference to members in the general approach. Note first the definition of Document States to clarify the lifecycle stage of an RP. Note also that the SAWE sequential numbering of standards was replaced in 2011 with the adoption of SAWE Technical Overview TO-1 "Overview of Mass Properties Engineering for Vehicle Systems" [11]. The sequential numbering is in fact enhanced by the prefix addition of A for Aerospace, M for Marine, G for Ground System, and C for cross-industry related activities.

The RP Document States are:

1. WD (Working Draft) Prefix for a document which an individual or committee has decided to develop and has begun work on. Ex: WD RP A-1
2. CD (Committee Draft) WD becomes a CD prefix when the individual/group working on it desires to promote it to an outside [of committee] review, typically this is a solicited review seeking other members which hold interest in the RP's subject matter and possess expertise in that area. Ex: CD RP A-1

3. PD (Public Draft) CD becomes a PD prefix when document review and revision bring the document to a state which provides a document suitable for public review and comment. This supports ANSI Open Standards development requirements and may permit the SAWE to later submit final document to ANSI for consideration as a U.S. and International Standard. Ex: PD RP A-1
4. No prefix Final Deciding Body approved SAWE Recommended Practice. Ex: RP A-1

The activities associated with the above document states are summarized as the following process steps:

1. Propose idea to SPC chairman (spcchair@sawe.org)
With approval from SPC chairman a template document is provided with a WD number.
2. Work to agreement of committee (or individual acceptance if no committee) that the document is ready for internal SAWE members only review. Provide a copy suitable for internal SAWE review to the SPC chair. This document will be upgraded to CD status by the SPC Chair and posted for internal SAWE review.
3. Adjudicate comments between SAWE internal review and committee drafting the RP.
4. Upon acceptance by SAWE internal review and the SPC chair, the SPC chair shall upgrade the status of the document to PD.
5. SPC chair posts the PD document for full public review on the SAWE website for comments from members and non SAWE members. [suggested open review period time of 60 days] SPC chair coordinates incoming public comments with the document creation committee.
6. Upon resolution of public comments by the document committee and the SPC chairman the PD status document will be provided to the Deciding Body for review and for acceptance voting as a public SAWE Recommended Practice. The Deciding Body will be a technical committee instantiated by the SPC chairman. The SAWE President may accept the decision of the Deciding Body or may request further review and acceptance for example by the Society's Board of Directors.
7. Upon acceptance of the PD submission by the Deciding Body and SAWE President's concurrence, the document will be provided full SAWE RP status with a distribution policy as is utilized on all BOD approved SAWE RP's at the time of release.

Industry committee participants, and all SAWE members, should at minimum be aware of the recent SAWE/ANSI activities and note that they may soon have the ability to promote a SAWE RP to an ANSI/SAWE standard or even an ISO standard. This process will not be without

restriction though as there is additional cost to the society to make an ANSI standard. The SPC will have oversight as to which documents the SAWE desires to promote to ANSI status.

ANSI / SAWE Standards

To become an ANSI Accredited Standards Developer the SAWE was required to draft a publically available document which states the society's methods of creating such standards. This includes primarily the organizational structure utilized by the SAWE and the details of its consensus body process. Guiding that process development was the need to meet ANSI "Essential Requirements" [3]. Per ANSI "*These requirements apply to activities related to the development of consensus for approval, revision, reaffirmation, and withdrawal of American National Standards (ANS). Due process means that any person (organization, company, government agency, individual, etc.) with a direct and material interest has a right to participate by: a) expressing a position and its basis, b) having that position considered, and c) having the right to appeal. Due process allows for equity and fair play. The following constitute the minimum acceptable due process requirements for the development of consensus.*" The highlighted text is so noted to make SAWE members aware of the degree of openness required to create an ANSI standard. This is different from typical SAWE Industry Committee work on RP's which took place primarily amongst only SAWE members and at member restricted international meetings. Meetings for ANSI/SAWE standards work will not be member restricted, they may occur virtually as well as in person, but should be accessible to all members of the Consensus Body which again is not SAWE member restricted. Recorded voting is done through a time allotted balloting process, not solely during a single per-annum meeting as is often done with RP's.

Before we describe the details of the SAWE's procedures to create ANSI standards we first wish to make note of the ten guiding principles which are basis for the ANSI Essential Requirements.

1) Openness: Participation shall be open to all persons who are directly and materially affected by the activity in question. There shall be no undue financial barriers to participation. Voting membership on the consensus body shall not be conditional upon membership in any organization, nor unreasonably restricted on the basis of technical qualifications or other such requirements.

2) Lack of dominance: The standards development process shall not be dominated by any single interest category, individual or organization. Dominance means a position or exercise of dominant authority, leadership, or influence by reason of superior leverage, strength, or

representation to the exclusion of fair and equitable consideration of other viewpoints.

3) Balance: The standards development process should have a balance of interests. Participants from diverse interest categories shall be sought with the objective of achieving balance. If a consensus body lacks balance in accordance with the historical criteria for balance, and no specific alternative formulation of balance was approved by the ANSI Executive Standards Council, outreach to achieve balance shall be undertaken.

4) Coordination and harmonization: Good faith efforts shall be made to resolve potential conflicts between and among existing American National Standards and candidate American National Standards.

5) Notification of standards development: Notification of standards activity shall be announced in the ANSI Project Initiation Notification System (PINS) and suitable media as appropriate to demonstrate an opportunity for participation by all directly and materially affected persons.

6) Consideration of views and objections: Prompt consideration shall be given to the written views and objections of all participants, including those commenting on the PINS announcement or public comment listing in Standards Action.

7) Consensus vote: Evidence of consensus in accordance with these requirements and the accredited procedures of the standards developer shall be documented.

8) Appeals: Written procedures of an ANSI-Accredited Standards Developer (ASD) shall contain an identifiable, realistic, and readily available appeals mechanism for the impartial handling of procedural appeals regarding any action or inaction. Procedural appeals include whether a technical issue was afforded due process.

9) Written procedures: Written procedures shall govern the methods used for standards development and shall be available to any interested person.

10) Compliance with normative American National Standards policies and administrative procedures: All ANSI-Accredited Standards Developers (ASDs) are required to comply with the normative policies and administrative procedures established by the ANSI Executive Standards Council or its designee.

From these ten principles and additional specific guidance in the ANSI Essential Requirements, the SAWE ANSI accreditation committee created SAWE Technical Overview TO-2 “SAWE Procedures as an Accredited Standards Developer with the American National Standards Institute” [4]. TO-2 is a document which serves two primary purposes; 1) as an official response to ANSI on how the SAWE complies with ANSI “Essential

Requirements”, and 2) as a reference document for SAWE members to consult when they desire to create and are required to maintain an ANSI/SAWE standard. Parts of TO-2 are extracted here to provide a brief description of the process and organizational requirements. TO-2 was created in 2013 and was circulated to the SAWE executive board and SPC industry committee directors for general comments. At a later state the document was made available to all SAWE members and was eventually posted on the SAWE standards website for a 30 day public review period. All comments have been addressed in this first published version. This is the version submitted to ANSI in January 2014 and is at time of this writing under review by the ANSI Executive Standards Council’s (ExSC) Subcommittee on Accreditation (SC-A).

Figure 1 defines the organizational structure in place to implement SAWE ASD procedures.



Figure 1 – Organization for SAWE Standards Development

The purpose of the Standards Approval Council (SAC) is to review and affirm or reject SAWE endorsement of a proposed standard by simple majority vote. Only allowed votes are “Approve”, “Reject” or “Abstain”. Members are the SAWE President, Executive Vice President, SPC Chairperson, Chairperson of the in question standards development Consensus Body and representatives from each corporate member as per the SAWE Corporate Partner Program. If necessary the SAWE President vote breaks a tie.

SAWE Corporate Membership Participation in the Standards Approval Council provides the following voting strength:

Corporate Partner- Gold – 3 voting representatives maximum

Corporate Partner – Silver – 1 voting representative

Standards Approval Council members who are affiliated with a Corporate Partner count against the number of allocated Corporate Partner representatives.

Below the SAC in Figure 1 is the Standards Review Board (SRB) led by the SPC chairperson. Members include SPC Immediate Past Chair, SPC Industry Committee Chairs, and others appointed by the SPC Chair. The purpose of this board is to review each new or revised standard to assign a document number per SAWE TO-1 and SAWE TO-2 ANSI compliance guidelines; to ensure that a standard document format [word template available online] and established conventions were followed; that ANSI requirements are satisfied; and that overall quality is acceptable to the SAWE. Unsuitable products are returned to the Industry Committee. The SPC Chair has final decision.

Industry Committees

This is the level at which SAWE implements Consensus Bodies to develop and maintain our standards. There are currently 6 standing Industry Committees. 1) Airline Affairs, 2) Ground Systems, 3) Marine Systems, 4) Missile and Space Systems, 5) Military Aircraft and 6) Marine Offshore Systems. These committees are made up of industry experts in mass properties in the particular industries indicated. Participation in an industry committee is open to all SAWE members. SPC Industry Committees identify the need for standards or other products that benefit their activity. They may be solicited by materially affected entities to pursue a standards development or maintenance activity.

Industry committees employ a Consensus Body approach to develop and maintain SAWE standards. At the discretion of the SPC chairman, the chairperson of an industry committee will chair the consensus body or be permitted to appoint a Consensus Body Chairman for a standards activity. SAWE membership is not a prerequisite to participate in an SAWE Consensus Body.

In the case of a standard activity which does not align singularly with the interest of an SAWE standing Industry Committee, the SPC chairperson will instantiate a special committee Consensus Body and serve the role of this Consensus Body chairperson, or create an appointed chairperson. The special committee will also solicit across the full domain of interest for potential participants through the SAWE website standards activity announcement section, electronic mail, and through the ANSI PINS process.

The creation of SAWE ANSI standards follow the Process Steps outlined in Appendix B and utilizes the following document states. Document numbering shall follow the nomenclature defined in [11] where the word

“standard” is used in place of “recommended practice”, and numbering utilizing RP shall utilize STD. For example a SAWE recommended practice document number would be SAWE RP A-1, and an ANSI SAWE standard would be ANSI/SAWE STD A-1 2012.

SAWE consensus bodies shall use the following document states to delineate phases of standard development and to mark documents within an associated phase of development, note the alignment with the prior defined SAWE RP document states.

- 1) WD (Working Draft): Prefix for a document which a consensus body has initiated work on. Ex: WD STD A-1. The WD status is maintained until there is an SAC review.
- 2) CD (Committee Draft): When the consensus body is ready to receive input from the SAC the document is promoted to CD status. Upon SAC review completion the consensus body considers and adjudicates SAC comments. Ex: CD STD A-1.
- 3) PD (Public Draft): When the consensus body is ready to receive input from the public the document is promoted to PD status. This coincides with use of ANSI BSR form 8 and the ANSI standards action posting procedures. Ex: PD STD A-1.
- 4) no prefix: Final approved SAWE / ANSI document state. Ex: ANSI/SAWE STD A-1 2012.

To assist SAWE consensus bodies in the creation and maintenance of ANSI/SAWE standards some initial template files have been created. These files are available online at www.sawe.org/rp/forms. Forms are available regarding:

- consensus body rosters
- consensus body voting records
- current consensus bodies
- document comment tracking
- meeting minutes
- standards development record
- appeals tracking

Example Applications

As early as the SAWE ANSI accreditation committee began its work in earnest, a parallel effort on utilizing SAWE/ANSI type procedures to create a standard for weight reporting in the commercial aircraft industry was established. Mr. Jose Attar of the Airbus corporation leads this effort which has been invaluable in informing the SAWE/ANSI committee on issues that derive from this

more formal and more open method of standards creation than is typical for SAWE RP's. A consensus body was solicited in an open manner by Mr. Attar and an international cross section of some 25+ participants was selected which represent airline producers, users, and vendors. This special committee consensus body maintains minutes, voting records, and all such pertinent information to document the open development process. Work is accomplished throughout the year without physical meeting except as has been convenient at the International SAWE annual conferences. Non-SAWE members are also a part of the consensus body.

In another standards related effort SAWE members are currently participating in the maintenance updates to AIAA-S-120-2006 "Mass Properties Control for Space Systems" and RP-11, the SAWE version of the same topic. A collaboration and harmonization activity between AIAA and SAWE was established whereby this maintenance action will position the AIAA document to be an acquisition style requirements document for submission as an ANSI/AIAA standard. The RP will be focused to provide industry best practices in space system mass properties. In this instance SAWE influence is through a Memorandum of Understanding with AIAA and will likely also affect procedures at the ISO level as AIAA considers possible replacement of ISO-22010 "Space systems-Mass properties control" with the ANSI/AIAA S-120 standard.

There are other SAWE RP's which could be candidates for promotion to ANSI standard status, particularly in the Marine sector. This topic in general will hopefully be increasingly addressed by all SAWE SPC committees in their future work.

Forward Work

It is hoped that by the time of this paper's presentation in May 2014, the SAWE will have received approval as an ANSI accredited Standards Developer. However it is also likely that the proposed procedures in SAWE TO-2 will require revision to fully meet the ANSI Essential Requirements. The primary forward work for the SAWE committee on ANSI accreditation will then be to make appropriate adjustments to the document, and obtain the sought after ANSI approval. Then a revised version of SAWE TO-2 will be made available to the membership through the RP process.

After that there is much the SAWE can do to support our SPC members in their efforts to create ANSI standards. Improving the rather preliminary support

templates is one task. Improving the SAWE standards and practices website is also desired, and making more web based working documents could also be investigated for providing consensus body process support. In general committee work will continue as a source of support to the SAC, the SRB, the industry committees and their formulated consensus bodies. This committee will closely follow the activities of the first SAWE consensus body to officially implement better possible procedures into TO-2 and learn from that experience what our membership and the Mass Properties Engineering community at large requires to improve its ability in efficiently creating quality standards for our discipline in all industry sectors and across common industry activities.

SAWE members are encouraged to contact spcchair@sawe.org if they would like to comment on or particularly if they would like to participate in improving SAWE's RP and ANSI Standards related procedures. Note also that email notification of SAWE standards activities can be subscribed to at: <http://www.sawe.org/rp>

Summary

The SAWE is moving towards having the capability to create ANSI accredited U.S. national standards and ISO international standards. This paper describes how the existing SAWE RP development procedures co-exist with the proposed SAWE ANSI procedures and provides some status of both activities. A SAWE committee was assembled to create and vet the ANSI based procedures with SAWE management and the general membership. The resulting procedures were submitted to ANSI for accreditation. In January of 2014 the procedures were posted by ANSI using its Project Initiation Notification System. This paper also describes the relationship of SAWE to the standards societies, ANSI and ISO and introduces the reader to the existence and philosophies of the United States Standards Strategy, and the ANSI Essential Requirements for standards creation. Both RP and ANSI/SAWE procedures are discussed and contrasted. Current associated work in utilizing the ANSI/SAWE procedures to create a document for weight reporting during commercial aircraft development is highlighted, and the future work envisioned for SAWE in its continuing journey to provide quality standards for general Mass Properties Engineering activities at a national and international level are stated.

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Appendix A
SAWE - ANSI Accreditation Process Development Committee

<u>Last</u>	<u>First</u>	<u>Affiliation</u>
Bennett	Dave	Worley Parsons / Corporate
Brooks	Andy	Lockheed Martin / Corporate
Cerro	Jeff	NASA / Government – Committee Lead
Davis	Ed	Boeing Corp. / Corporate
Griffiths	Bill	The Aerospace Corp / FFRDC
Kayali	Nehru	Sierra Nevada Corp. / Corporate
Peterson	Eric	Intercomp Co. / Corporate
Stratton	Bonnie	US Coast Guard / Government
<u>Supervisory Committee</u>		
Zimmerman	Robert	Lockheed Martin / Corporate (during development)
Boze	Bill	Huntington Ingalls Industries / Corporate
Fox	Ron	Self / SAWE
Titcomb	Alan	Huntington Ingalls Industries / Corporate
Primozych	Anthony	USAF / Government
Ridenour	Bob	Self / SAWE

Appendix B
Development Steps for an ANSI/SAWE standard

Step	Action / Responsible Party	Action Description	Timeline Considerations
1	Standard Activity Identified / Party of interest	Standard action identified, party of interest proposes idea to the SPC Chairperson.	anytime
2	Assignment to Consensus Body Chairperson / SPC Chairperson	Upon accepting the proposed development the SPC Chairperson appoints the SAWE Industry Committee chairman a Consensus Body Chairman or cedes that appointment authority to the Industry Committee Chairman. If the activity is not within the interest of an existing Industry Committee the SPC Chairman creates a special committee and committee chairman. The SPC chairperson assigns a WD document number, and then notifies the SAC (Standards Approval Council) of the WD and to which committee and CB Chairperson this task has been assigned to.	goal to complete within 15 days
3	PINS action, notification / Consensus Body (CB) Chairperson	CB Chairperson selects/defines interest categories for the task, typically 1) producer 2) user-government 3) user-industry 4) general interest, secondarily others possible as noted in Sec. 2.3. Proposals for initiation of American National Standards projects are transmitted to ANSI using the Project Initiation Notification System (PINS) form, for listing in Standards Action in order to provide an opportunity for public comment. All comments received as a result of this announcement are handled in accordance with clause 2.4 of the ANSI Essential Requirements, process step 6.	goal to submit PINS action within 15 days
4	Consensus Body formation / Consensus Body Chairperson	Instantiates Consensus Body Formation tasks. Includes public announcement of the proposed activity on the SAWE public website and email notification to all current SAWE members. Minimum 30 day response time required. Selection of a Consensus Body is made with regard to interest category balance. Consensus Body may be limited to no less than 5 members, no limit on maximum but practical cutoffs of 15-20 are reasonable and customary. SAWE membership is not a prerequisite to participate in an SAWE Consensus Body. Participation in an SAWE SPC consensus body is open to all persons (organizations, companies, government agencies, individuals, etc.) who are directly and materially affected by the activity in question. Interested participants need not be members of the SAWE.	30 day minimum for PINS response allowance goal of 15 additional days to complete CB definition
6	Harmonization / Consensus Body Chairperson	If open solicitation of the standards development/maintenance activity, including the ANSI PINS process, reveals conflict between said development and another existing or planned ANS document a harmonization process guided by the ANSI ExSC is undertaken. Participation in ANSI ExSC resolution steps including participation in an ExSC ad-hoc group for conflict resolution will be undertaken by a member or members of the SAWE proposed consensus body. The consensus body chairperson guides SAWE participation to comply with associated ANSI ExSC guidance. <ul style="list-style-type: none"> • A summarizing document on the harmonization activity is posted with unrestricted access on the SAWE standards website. In that manner potentially similar future activities have access to lessons learned from prior harmonization and conflict resolution activities. 	Good faith 90 day deliberation period, may be longer. additional 30 days to report deliberation status to ANSI
7	WD Document Development /	Preliminary document development occurs using the SAWE Standards Development document phases, Sec. 7.2. Work begins	

	Consensus Body Chairperson	with the document as WD status	
8	CD Document Development / Consensus Body Chairperson	WD version of the document is collaboratively developed to a point acceptable for SAWE internal review. The WD is promoted to a CD document for review by the SAWE SAC.	Typically within a year, may be longer for complex initiatives
9	SAWE SAC comment period/SAC	The SAC provides to the consensus body, guiding thoughts/comments based upon review of the CD document.	goal of 45 day response time from SAC
10	PD Document Development / Consensus Body Chairperson	The consensus body considers and adjudicates SAC comments. The document is brought to a state suitable for public review and the document is promoted to PD status.	no maximum, goal of 60 days
11	Public Comment Period / Consensus Body Chairperson and VP Internet Operations	<p>When a draft American National Standard is available for public comment, the SAWE submits a BSR-8 Form. This form initiates a public review and comment period in <i>Standards Action</i>.</p> <p>A minimum of thirty (30) days if the full text of the revision(s) can be published in <i>Standards Action</i>; A minimum of forty-five (45) days if the document is available in an electronic format, deliverable within one day of a request, and the source (e.g., URL or an E-mail address) from which it can be obtained by the public is provided to ANSI for announcement in <i>Standards Action</i>; A minimum of sixty (60) days, if neither of the aforementioned options is applicable.</p> <p>The SAWE also may announce the availability of the document for review in any relevant trade publications, in order to reach a broader constituency. If further revision of the text is proposed and the revised text can be published in full within 5 pages, the public review period may be 30 days.</p> <p>Accredited standards developers must respond and attempt to resolve all comments received as a result of the public review period. Unresolved objections, attempts at resolution and any substantive change made in a proposed American National Standard shall be reported to the consensus group in order to afford all members an opportunity to respond, reaffirm, or change their vote.</p> <p>Subsequent substantive changes require additional public review; document is made available for public review on the SAWE website by the VP Internet Operations)</p>	<p>30,45, or 60 day public comment period as noted in text</p> <p>adjudication of public comments follows and may be repeated for substantive changes.</p>
12	Draft Document Balloted to Consensus Body / Consensus Body Chairperson	<p>Draft document balloted to consensus body (CB)</p> <ul style="list-style-type: none"> • All members of the consensus body are provided the opportunity to vote on standards development issues. If voting is held at a location where all members may not be present, they are provided a letter ballot or email opportunity to vote. That vote must be received within 2 weeks of its solicitation. Solicitation may occur prior to a location based voting process and in such instance votes may be accepted up a 2 week period after the vote was held. • Regarding standards balloting, each member of the CB shall vote one of the following positions : <ol style="list-style-type: none"> a) Affirmative; b) Affirmative, with comment; 	goal to complete the balloting process within 30 days, minimum 14 days required

		<p>c) Negative, with reasons (the reasons for a negative vote shall be given and if possible should include specific wording or actions that would resolve the objection);</p> <p>d) Abstain.</p> <ul style="list-style-type: none"> • Votes for the approval of a standards action may be obtained by letter, fax, recorded votes at a meeting or electronic means. All members of the CB shall have the opportunity to vote. When recorded votes are taken at meetings, members who are absent shall be given the opportunity to vote before or after the meeting. • Record and consider all negative votes accompanied by any comments that are related to the proposal under consideration. This includes negative votes accompanied by comments concerning potential conflict or duplication of the draft standard with an existing American National Standard and negative votes accompanied by comments of a procedural or philosophical nature. These types of comments shall not be dismissed due to the fact that they do not necessarily provide alternative language or a specific remedy to the negative vote. • Require a majority of the CB cast a vote (counting abstentions) and at least two-thirds of those voting approve (not counting abstentions). • The CB is not required to consider negative votes accompanied by comments not related to the proposal under consideration, or negative votes without comments. • The CB shall indicate conspicuously on the letter ballot that negative votes must be accompanied by comments related to the proposal and that votes unaccompanied by such comments will be recorded as “negative without comments” without further notice to the voter. If comments not related to the proposal are submitted with a negative vote, the comments shall be documented and considered in the same manner as submittal of a new proposal. If clear instruction is provided on the ballot, and a negative vote unaccompanied by comments related to the proposal is received notwithstanding, the vote may be counted as a “negative without comment” for the purposes of establishing a quorum and reporting to ANSI. However, such votes (i.e., negative vote without comment or negative vote accompanied by comments not related to the proposal) shall not be factored into the numerical requirements for consensus, • The CB is not required to solicit any comments from the negative voter. • The CB is not required to conduct a recirculation ballot of the negative vote. • The CB is required to report the “no” vote as a “negative without comment” when making their final submittal to the BSR unless the ASD has been granted the authority to designate its standards as American National Standards without approval by the BSR. • Maintain records of evidence regarding any change of an original vote. • For votes on membership and officer-related issues, the affirmative/negative/abstain method of voting shall be 	
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			inactions regarding any standards development activity may be made at any time
16	Appeals conclusion / Consensus Body Chairperson	Appeals process concluded or appeals filing period expires Unresolved Comments – All canvasees or public commenters with unresolved comments related to an “affirmative with comment” or “negative with reason” vote shall be informed of their right to appeal.	goal of 30 days for appeals resolution at CB level
17	SAWE governance approval / SAWE SAC	SAC vote for approval of the document as an SAWE document. Negative votes are not considered without comment. Voting follows the same form as in a standards vote. (Step 12)	20 days minimum
18	Document Submission to ANSI / SPC Chairperson	Documentation submitted to ANSI via BSR-9 form, which includes final tally by interest category of consensus body vote and other supporting documentation demonstrating evidence of consensus and due process. BSR-9 Form - Final Submittal Following the consensus ballot (or reconsideration ballot) and completion of any appeals, if the accredited standards developer determines that consensus has been achieved, the standard is submitted to ANSI for approval, accompanied by a BSR-9 Form. The accredited standards developer has six months from the close of the public review period to submit the BSR-9 Form. The final submittal must include documentation of all outstanding objections. An extension is permitted, upon request from the accredited standards developer, in those instances where good cause for a different schedule is provided. Submittals with no outstanding negative consensus ballots or public review comments (uncontested cases) are administratively approved by staff on behalf of the ANSI Board of Standards Review (BSR). If the submittal contains unresolved negative votes or public review comments, the documentation provided by the developer via the BSR-9 form is submitted for review by the BSR for final approval by letter ballot. At the close of the ballot period, the accredited standards developer is informed by letter of the approval or denial of the standard. An appeal of this decision of the ANSI BSR may be filed by the standards developer or by any participant who concluded the appeals process at the standards developer level.	submit within 6 mos. from close of public review period
19	ANSI	Approval of document by ANSI Board of Standards Review (BSR)	-
20	ANSI	Notification by ANSI of the right to appeal procedural, not technical, issues to the ANSI BSR (In the case of an Audited Designator, there is no notification by ANSI and any related appeals are filed with the ANSI ExSC)	-
21	ANSI	Notification by ANSI of right to appeal an ANS BSR or ANSI ExSC decision to the ANSI Appeals Board	-
22	VP Internet Operations	Posting of the SAWE ANS Standard on the SAWE website for public distribution	goal of 30 days from date of ANSI approval notification to

Author Biographies:

Jeff Cerro has over 30 years of experience at the NASA Langley Research Center. He is currently a structural mass properties and vehicle systems analyst in the Vehicle Analysis Branch. He has been active with the SAWE for 15 years and held positions at the local and international level, including Government/Industry Chairman and Society Executive Vice President. From his time as G/I chairman (Now the Standards and Practices Committee) he has focused on assisting SAWE in becoming ANSI accredited as desired by the industry sector committees. Mr. Cerro is a registered Professional Engineer with a Masters in Mechanical Engineering from Rensselaer Polytechnic Institute. He is also an SAWE Honorary Fellow and senior member of the American Institute of Aeronautics and Astronautics.

Ed Davis has worked at the Boeing Company in the Weights Group on wide body (747, 767, 777, and 787) commercial airplanes for 35 years. His work includes development of the airplane Mass Properties, creation and signoff of the of the Weight and Balance Manuals, developer of Loading Schedule training material, responding to airlines weight and balance questions, support of the PD group, responsible for airplane weighing certification requirements, and weight and balance instructor. He is also been a SAWE member for over 20 years. At SAWE, Ed has led the manned flight session, led the Airline Affairs session, has written several papers, was the co-chairmen of the 2008 conference in Seattle, currently is the focal for the inputs to the draft AC120-27F (dealing with passenger and baggage weights), and is a SAWE Fellow.

Eric Peterson is Vice President of Sales & Marketing for Intercomp Company, a manufacturer of high capacity portable weighing and measurement equipment for the transportation industry. Mr. Peterson holds a BA from University of Minnesota and has served in various capacities with test and measurement companies including product development, applications engineering, sales and executive leadership. He is recognized as an Honorary Fellow by the SAWE and previously served as Vice President and President of the professional organization.

Bill Griffiths has over 40 years of experience in the aerospace industry. In his early career, he worked mass properties analysis for missiles and launchers, aircraft, and surface ships. In the 30 years he worked for Hughes Aircraft/Boeing Space Systems, he held positions as a project manager and department manager for mass properties, and as senior project manager for structural design. He is currently working for the Aerospace Corporation as a part-time employee, focusing on specification and standards activities. Bill has been involved in the development of mass properties standards for AIAA, ISO, and the SAWE since the mid-1990's. He is currently working as Chief Technical Editor with NASA to revise the primary mass properties control document for space systems. Bill received his Bachelor of Science in Mechanical Engineering from Stanford University. He has been an SAWE member since 1973, and is an SAWE Fellow.

Andy Brooks has over 27 years' experience in Mass Properties. He is currently working for Lockheed Martin Aeronautics on the F-35 Program. His previous experience includes development of Lockheed Martin's Mass Properties Data Management System, Mass Properties Technical Lead on the F-16 Block 60 program, numerous other military and commercial aircraft programs including Boeing 787, C-17, Gulfstream V, and B-2 programs. His SAWE accomplishments include winning the Outstanding Young Engineer Award in 1998, he was named Fellow in 2008 and Honorary Fellow in 2012. Andy is currently serving as SAWE Vice President of Internet Operations.

Bonnie Stratton has over 25 year's aviation experience. She holds a Master's degree in Quality Systems Management. As the Weight and Balance Program Manager for the US Coast Guard, Bonnie ensures standardization across the myriad of airframes and Air Stations within the Coast Guard. She provides training on software systems and applications to ensure consistent baseline aircraft configuration management. Recently Bonnie has been working with members of the SAWE in moving the RP's toward international standards acceptance. Bonnie has been a member of the SAWE for over 10 years.

Jose Attar holds a Master's degree in Aeronautical Engineering from the University of La Plata, Argentina. Throughout his 30 year career in Aerospace Mr. Attar has worked in commercial aviation and the US Space Program holding Propulsion Analysis, Weights Analysis, Project Management and Strategic Planning positions in programs such as the Space Shuttle External Fuel Tank, X-33 Reusable Space Plane and ISS Crew Rescue Vehicle. José is currently Head of Mass Properties for AIRBUS at the Mobile, AL Cabin & Cargo Engineering Center and has been active in SAWE Chairing a SPC Special Committee in the development of a Standard for weights reporting in Aviation.