**TRIP REPORT– Rod vanDyk – Senior Mass Properties Engineering Analyst – Safran Landing Systems**

***SAWE International Conference on Mass Properties Engineering – May 18-22, 2019, Norfolk, Virginia***

**Saturday, May 18. 2019**

***SAWE Executive Board meeting – 8am -5pm***

* Representative for SAWE Canada Chapter giving voting strength for all items on the agenda requiring acceptance by the board.
* Significant discussion on financial health of SAWE International
* Current 2019-2020 budget forecasting a deficit of close to $20,000 US.
* Majority of board members rejected this deficit and chose to reduce the honorariums for both the incoming Executive Director and Financial VP. These actions reduced the deficit to less than $5000.
* As deputy VP Vendor Relations and one who participates in the Corporate Sponsorship, we were actioned to diligently work at getting more corporate partners to help alleviate the remainder of the budgeted deficit to bring the organization back into financial health.
* Other major topic for this and the remainder of the conference was the goal to establish a MPE certification program which would be ANSI certified. The SAWE has set a target for a 2 year project involving many key leaders in the organization to establish an MPE General and industry specific certification course. Steps are already occurring to prepare the general course. I will be involved in monthly progress meetings to support these efforts and provide feedback where necessary. Some tasks may get assigned to me as well, but I have warned the coordinators that my time may be limited due to current workload.

**Sunday, May 19, 2019**

***Aircraft Fuel System Calibration and Verification – 8am to 12 noon***

* Taught this class for the third year in a row
* 4 students attended this class – 2 from Gulfstream Aerospace, and 2 from Boeing Military
* 2018 SAWE VP – Training (Jerry Pierson) also attended the course to review and audit my teaching techniques and effectiveness of the course.
* Teaching survey was handed out at the end of class with very positive feedback on both the technical content and teaching effectiveness – an official report from current SAWE CP – Training (Dan Rowley) will be sent as a follow-up in the coming days

**Monday, May 20, 2019**

***Technical Tracks - 8am to 5:30pm***

8:00 am – **Opening Remarks and Presentation** – Conference co-chairs and Dawn Schaible – Director Engineering, NASA LaRC

* very interesting presentation on the current status of the Moon to Mars project - focused on the recent success of the Mass Properties team in verifying the mass properties of the Crew Capsule, specifically on the work being done for the Artemis Program which is hoped to launch in 2024 sending the first woman and next man (from the USA) to the moon. Partnerships with commercial industries are enabling this phase to occur. This first phase will establish a command center (Gateway) on the moon to prep for a moon landing. Phase 2 will be to establish sustainability on the moon in order to prep for a human exploration to Mars.

9:00 am – **Paper 3713 Inspiring the Engineering Future Workforce through NASA’s Capabilities** – Anne Weiss and Rosemary Smith – NASA

* Key points from this presentation was their study in determining that the 2020 Engineering students will require the following to be successful:
	+ Technical content knowledge
	+ Analytical skills
	+ Practical skills
	+ Collaborative skills
	+ Strong Ethical Standards
	+ Life – long learner
	+ Appreciation for various cultural, societal groups
	+ Ability to integrate with multiple disciplines
* The last two bullets are what is lacking in today’s new engineers – NASA is diligently working with school communities (already before post-secondary) to focus on this

10:00 am – **Paper 3729 Application of Basic Parametric Methods** – Douglas Fisher – UTC Aerospace Systems (now Collins Aerospace)

* Highlighted some basic ways to modify our existing parametric tools to provide better fidelity – was used by Doug to convincingly show excellent fidelity of his parametric data to prove to potential customers. The following methods are used to extract the right data to use for parametric formulas based on historical data:
	+ r² - coefficient of determination
	+ F-statistic – determines if the relationship is statistically significant
	+ Kurtosis – measures whether there are outliers in your distribution of data
	+ Bias – average error in the estimate
	+ Standard Deviation
* This paper was based on the tools being taught at the yearly Parametric course held at SAWE Conferences by Andy Walker from Lockheed Martin –
* I believe this would be a good course for many chapter members to take in the future due to the positive responses that I have heard from various attendees including the author of this paper

11:30 am – **Paper 3716 Methods of Determining Parametric Equations from Data with a worked example** – David Hansch – Huntington Ingalls Industries – Newport News Shipbuilding

* Very similar paper to the previous but presented in a very different manner using data from the shipbuilding industry.
* A good reminder to use the right metrics to build our parametric curves.
* Again, convincing results to possibly update the parametric data that we currently maintain in our organizations to increase fidelity.

Other morning presentations were vendor presentations – not fully related to our tasks or industry

 1:30 pm – **Mass Properties Certification Forum** – moderated by Yi-Ling Tam – The Aerospace Corporation

* This interactive forum discussed the recent SAWE initiative to establish a certification program for mass properties engineers. A panel of experts gave their rationale for certification, the path to establishing the SAWE as a certification authority, certification standards, training, testing, and desired outcomes.
* There was a significant amount of discussion from many of the attendees which help to garner support and volunteers.

3:30 pm – **Paper 3710 Application of the Law of Propagation of Uncertainties to a Weight and CG Measurement System** – Anjie Emmett, Analytic Mechanics Associates

* Excellent paper that won the best paper award. This was a detailed explanation to define the level of uncertainty in any physical weighing operation – this paper will come in handy when needing to do similar exercises for weight verification in our projects

4:30 pm – **S3725 HERMES: Hazard Examination Reconnaissance Messenger for Extended Surveillance** – Dr. Donna Gerren for Marcus Mejia – University of Colorado

* Student paper that won best student paper award
* Very interesting concept of an autonomous vehicle that could be used to deploy forest fire detection drones

5:00 pm – **Weight Considerations on the Appalachian Trail** – Nicholas Marickovich – HII – Newport News Shipbuilding

* Very “entertaining” and light-hearted approach to talk about the practicalities of weight- control

**Tuesday, May 21, 2019**

***Standards and Practices - 8am to 3:00pm***

* Attended opening session which outlined the previous year’s activities of the S&P committee members along with the progress of new Recommended Practices. Ground rules for Industry Committee Meetings were outlines for all attendees.
* I attended the Airline Affairs meeting for the whole day. Various issues currently affecting the airline industry were shared by two representatives (American Airlines, and Delta Airlines) – major issue at this time is the FAA’s request for our society to give direction on what a revised passenger and baggage weight should be going forward. Current figures are outdated and do not represent the North American flying public. Airlines are currently doing weight surveys to support their claims but need the approval of the entire industry…something the SAWE community can provide due to its international presence.
* These discussions will have a direct effect on how our aircraft structure and interiors are sized for future products. It will also impact declared range guarantees from aircraft OEM’s due to the erosion of useable fuel, etc.
* Many items were tabled for future discussion due to time constraints and will have to be discussed via monthly telecons/webex’s.

***ISO 10303 AP242s – 3:30pm to 5:00pm* –** Sebastien-Verian Herda - Airbus

* This presentation was meant to be collaborative since Sebastien was looking for consensus from the various aerospace representatives that would be impacted by a new Recommended Practice, RP-9 Data Exchange (Mass Properties Digital Data Attributes for PLM Data Exchange and Reporting).
* The purpose for the RP is to drive consistent PLM data and exchange protocols that will simplify MPD functionality set up in PLM and ERP systems. The STEP AP 242 file (ISO10303-242) is a system independent file format and is the best established specification within the automotive, aerospace, and defense industries. It specifies the application protocol for model based 3D engineering.
* **I had separate conversations with some of Airbus’ mass properties leaders and they informed me that this new process will have the benefit of having access to current model-based data (which will now include all the mass properties attributes) on a regular basis. They will use this to audit monthly progress reports from their partners/suppliers. Consistently, over the last several years, Airbus has expressed their frustration with the quality of data received from their partners. They believe that the adoption of this ISO standard and RP by all their partners will rectify this situation to some extent.**

**Wednesday, May 22, 2019**

***Technical Tracks - 8am to 5:30pm***

8:00 am – **Technical Forum – Weight Control** – moderated by Robert Zimmerman –Lockheed Martin (retired)

* An open forum to discuss what is involved in controlling weight – from defining the requirements, creating a plan and obtaining consensus among subsystems engineers and management, implementing and tracking the plan, contingency operations for off-nominal excursions, and finally piece part, subsystem, and final project verification
* There was a very lively discussion by the various attendees.Many of the issues I deal with on a daily basis are being share by most MPE’s in various transportation industries simply due to lack of resources allotted to our discipline. This fact would be excusable if there were no “weight control issues” in our recent projects. However, we are seeing many issues occurring that are driving up cost and schedule to rectify these situations. Our customers are also expressing their frustrations with their suppliers in not putting in the proper resources to drive efficient weight control.

10:00 am – **Paper 3721 A Weight and Center of Gravity Instrument for Measuring Manned Spacecraft** – Daniel Otlowski – Space Electronics

* A very informative presentation on how SE solved the issue of accurately verifying the mass properties of a manned space capsule
* Similar to Monday’s presentation, this presentation showed the benefits of addressing all sources of mass properties measurement uncertainty, through tool design, proper choice of load cells and overall design and integration with the capsule.

11:00 am – **Introduction to the SAWE** – Damian Yanez, Gulfstream Aerospace

* Damian’s chapter (Southeast chapter) have created a very good presentation that can be used to market the SAWE and its purpose to all prospective members, or corporate partners
* Our chapter can make use of this presentation as well to answer the common question: “what do I get for my SAWE membership?”

2:00 pm – **Paper 3714 Weight and Design Data for World War II Era United States aircraft** – Dudley Cate – NAVAIR (retired)

* Dudley is a highly respected mass properties engineer in the USA. He has authored several papers and has taught many classes at previous SAWE conferences. His history lesson was an important reminder that there is much historical data that we can still learn from on future products. His data was compared with existing ROSKAM data to show that the basic weight relationships between subsystems and overall aircraft weight held true.

2:30 pm – **Technical Presentation – Functional Small Parts made from Thermoplastic Composites** – Larry DiSano - Ensinger

* Larry gave some examples on where various industries are taking advantage of thermoplastics – these include automotive, health, bicycles, and also aerospace
* Key lesson learned here is that the cost of this process drives the need for small parts that are used in multiple locations of our products (ie: system bracket supports). Their thermoplastics can be designed to handle harsh environments while meeting the latest environmental standards for recycling capability

4:00 pm – **SAWE MPE Certification** – discussion on becoming part of certification team

* I attended this team meeting to see what would be involved to support the certification goals from the society.
* I have committed to attend the monthly meetings to review its progress and provide helpful feedback where necessary
* There are many highly experienced engineers on this team which should drive an excellent product for the team.
* **Of key note is here is the desire for many industries to adopt this certification process and drive their MPE’s to be certified along with the requirement for their partners/suppliers to have certified MPE’s working for their organizations. Again, another example of how our customers are driving the need for quality support in this discipline.**

**Summary**

This conference was significant in that it had an underlying theme of addressing the need to address the impending loss of many highly experience engineers in the next 5-10 years. The mass properties discipline is already being impacted by this fact, and our industries are finally starting to realize it. The SAWE has taken it upon itself to address this need and provide some tools to educate and certify the next generation of MPE’s. This is not to address the fact that our membership seems to be declining but is to benefit the corporate partners that we have who expect this benefit to their investment.