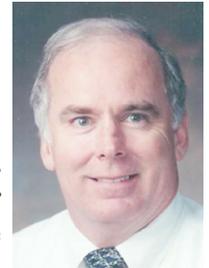




Training Program



Dan Rowley
Vice President – Training
Northrop Grumman Corporation



Jerry Pierson
Conference Training Coordinator
GKN Aerospace

The Society of Allied Weight Engineers Training Committee invites you to the 77th Annual International Conference on Mass Properties in Dallas-Fort Worth, and is pleased to offer you these classes for your professional development. These classes are offered to expand your expertise as a Mass Properties Engineer (MPE), and we hope that many of you will register for classes outside of your area of expertise or industry to broaden your technical capabilities. We hope that after taking these classes, you will emerge more knowledgeable and learn how special the discipline of weight engineering is across multiple industries. This year, the Training Program will take place at the Sheraton Dallas-Fort Worth Airport hotel from May 5 through May 10, 2018. The SAWE has a long proven track record of delivering outstanding training, and we hope that you will enjoy training with us here in Dallas-Fort Worth. New this year are several classes to reach out to the MPE who may have more special interests: Mass Properties & Automotive Lateral Dynamics, Designing Aircraft of the Future (2 Day class), and Materials and Mass Properties.

Introduction to Mass Properties Measurement

Wayne Clay – SAWE Member - Lockheed Martin Missile and Fire Control

This is a basic class which teaches measurement of weight, center-of-gravity, and moments of inertia (MOI). Effects of gravity variation due to latitude and altitude will be explained. This class will demonstrate and teach moment of inertia measuring techniques typically used for missiles and control surfaces. The Mass Properties Measurement class will contain both a classroom presentation and a laboratory session. The class will consist of approximately three hours of lecture and five hours of hands-on laboratory session with participants making mass properties measurements.

The classroom discussion will include mass definition and mass measurement techniques. Force measurement methods such as spring scales, load cells, strain gauges, and rebalance technology will be discussed. The MOI definition and its relationship to torque and angular acceleration and measurement techniques will be included. The definition of Product of Inertia (POI) will be discussed and how it relates to Principle Axes definition, measurement, and calculation techniques. Laboratory exercises will include mass measurement, center-of-gravity measurement, MOI measurement using a torsion rod and the bifilar method. POI measurement/calculation and principle axis measurement/calculation will be taught.

It is the intent of this class to provide the student with an understanding of the methods for measuring moment of inertia. The class will conclude with the taking of a test to verify that the class has provided the students with the basic understanding of how to measure moment of inertia of a missile or a control surface.

Basic calculators will be needed for examples and exercises. Please dress appropriately for working with measuring equipment.



Mass Properties & Automotive Lateral Dynamics

Brian Paul Wiegand – SAWE Member – Retired

The course objective is to enable the student to make reasonably accurate maximum lateral acceleration, rollover lateral acceleration, directional stability, and steering responsiveness determinations in the course of vehicle design. In route to attaining that objective, the student will also become acquainted with such things as the calculation of roll resistance, suspension roll center location, sprung mass roll axis inclination, sprung mass roll inertia, sprung mass roll moment arm, sprung mass roll angle under lateral acceleration, vehicle roll gain, vehicle dynamic index in yaw, transient center of rotation location, and transient yaw inertia. There will also be considerable time spent on “Ackermann Steering Geometry” relationships and the behavior of tires under lateral load.

The seminar achieves its objective through a classical engineering approach that emphasizes determining vehicle lateral performance through simple models and simulations which are easy to comprehend and apply. Mass properties will play a major role as attendees will become acquainted with the principles of “weight accounting,” mass properties manipulation, and mass properties optimization.

This seminar is very important for anyone engaged in vehicle design, in particular those designing with an emphasis on performance, and some special effort has been expended to make it particularly relevant for those involved in the SAE Student Formula Design Competition. However, no one completing this course will walk away without having acquired some degree of enlightenment; as well as a Certificate of Achievement and a print-out of the course Vu-Graphs, plus electronic (flash drive) copies of the SAWE Paper #3528 (“Mass Properties & Maximum Lateral Acceleration”) and the seminar’s “Maximum Lateral Acceleration Estimation Spreadsheet” (MS-Excel).

Designing the Aircraft of the Future

Jerry Pierson – SAWE Honorary Fellow – GKN Aerospace

Andy Walker – SAWE Member – Lockheed Martin

This two day class presents principles of weight engineering in new aircraft design as described in the SAWE Aircraft Weight Engineering Textbook.

Course topics include: Requirements Development, Aircraft Performance, Conceptual Aircraft Design Weight Estimates & Optimization, Weight Trades, Engine Selection, Vendor Weight Selection, Establishing Target Weights, Operational Weight, Preliminary Design Studies, Detail Design, and Database Management.

The class will use the issues that occur with future trainer aircraft as an example of applied weight engineering.

Students attending the class will receive a copy of the Aircraft Weight Engineering Textbook.

Materials and Mass Properties

Victor Hillyard – Ensinger Industries

The initial section of the course is to explain the development of thermoplastic materials from the early materials, which are now classed as commodity/packaging products in the aerospace industry, to the present day high performance materials, which are now being utilized in aerospace designs as replacements for traditional metallic components. Details of the properties of these high performance materials will be discussed, together with examples of actual applications.

Utilizing the properties of thermoplastics, comparing and contrasting with metallic materials, and the process of replacing traditional materials will be briefly discussed, at this juncture.



77th International Conference on Mass Properties – May 5-10, 2018

The latter section of the course will cover new and developing non-metallic materials, which will operate at more extreme conditions and have begun to replace traditional metallic systems in new aircraft design. Working examples will be on view, for discussion and examination.

Aircraft Fuel Systems

Rod van Dyk – SAWE Fellow – Safran Landing Systems

This class will cover the basic fuel usage process, including fuel quantity per tank measurement, fuel gauge calibration, usable and unusable fuel, and all aspects of fuel usage determined on the ground. Some hands-on non-flammable liquid density measurements representative of fuel density measurements will be part of the class. Class includes discussions on general operation, design, volume and center of gravity measurement, fuel sensors, fuel indicators, and fuel system operation.

Advanced Mass Properties Measurement

Paul Kennedy – SAWE Fellow – Space Electronics

This one day course is intended to provide training in the measurement of moment of inertia, center of gravity, and product of inertia, with emphasis on the various measurement methods used in industry. This class begins with a review of the definitions, and continues with the principles of mass properties measurement.

Principles of Weight Management and Weight Estimating Methods for the Offshore Oil Industry

David Bennett – SAWE Member – WorleyParsons

Due to the unique nature of design and construction of fixed and floating offshore oil facilities (very few of which are identical), the oil industry relies on accurate weight management to provide data to create information that is used for structural design, cost estimating and determining the most efficient means of transporting, lifting or towing a completed platform from a fabrication facility to its installation site.

Application of proven methods – based on historical weight data and experience – are employed to determine preliminary weights for offshore structures. This early data is used to calculate estimated design and fabrication costs that are part of an overall feasibility analysis to determine the commercial viability of development of an offshore oil field. Numerous technical (severe environmental conditions, high production rates, corrosive environments, etc.) and monetary (high weight equals high cost) challenges must be overcome before an owner is comfortable with proceeding to exploit a new oil field from discovery to production.

With floating production facilities being installed in water depths approaching 10,000 feet, it is critical to develop the correct platform type (semi-submersible, spar, FPSO (floating production, storage and offloading vessel). Weight management is one of the key tools used to determine the correct production scenario.

This training course will highlight the importance of weight management in the oil industry, present several of the methods typically used to create preliminary estimates of weight and center of gravity and walk through an example of estimating preliminary weight and CG data for a floating offshore platform.

After registration, please keep an eye out for an e-mail from the instructor. He will likely be sending out a list of reading material to review before the class.



Aircraft Weight & Balance Course

Tom Oole – SAWE Honorary Fellow – United States Air Force – Retired

This two-day course assumes a basic knowledge of weight and balance. The class will demonstrate and teach proper procedures for weighing and completing forms for military aircraft. The intent of this class is to provide the student with an understanding of the weight and balance system within the United States Air Force and “pitfalls” involved in weighing aircraft.

Students should bring basic calculators, paper, and pens/pencils for use in examples and exercises. Students should also dress appropriately for the trip to the aircraft hangar. Wear rubber-soled, closed-toed shoes.

Basic Mass Properties Measurement

Wayne Clay – SAWE Member – Lockheed Martin Missile and Fire Control

This half-day session will feature weight and balance topics and is intended to be mostly a hands on class demonstrating basic mass properties measurements. This class is geared for new engineers who have never:

- Measured density of solids and liquids
- Measured center of gravity of vehicles
- Measured moments of inertia

This class is for college students and those who have never seen Moment of Inertia measured and have not had the “Introduction to Mass Properties Measurement” class. Registration for this class is free for full-time college students.

If available, other class instructors will help out in this class with their unique discipline measurements.

Automated Weight and Balance System (AWBS) Software Training

Harold Smoot – SAWE Fellow – Lockheed Martin

This one-day class will present the features of the Automated Weight and Balance System in a hands-on software training class. The class will include explanations of the charts and forms (Chart A, Form B, Chart C, and Form F) explained in RP7 to maintain good operational weight and balance of military aircraft. The basic approach of the class is to give computer demonstrations followed by student exercises that provide the students with a good understanding of AWBS Version 10.0 features and capabilities. The instructor will also address students’ specific AWBS questions. All students are required to bring their own laptop computer running Microsoft Windows with AWBS 10.0 installed.

Developing Basic Parametric Methods

Andy Walker – SAWE Member – Lockheed Martin

The course will cover such topics as Basic Statistical Terminology, Statistical Correlation Processes, Parametric Estimation Pitfalls, and a Parametric Fighter Aircraft Wing Weight Correlation example.



Training Classes for May 2018		
Class	Day	Instructor
Introduction to Mass Properties Measurement	Saturday May 5	Wayne Clay
Mass Properties & Automotive Lateral Dynamics	Saturday May 5	Brian Paul Wiegand
Designing the Aircraft of the Future – Day 1	Saturday May 5	Jerry Pierson Andy Walker
Materials and Mass Properties	Sunday May 6 – Morning	Victor Hillyard
Aircraft Fuel Systems	Sunday May 6 – AFternoon	Rod van Dyk
Designing the Aircraft of the Future – Day 2	Sunday May 6	Jerry Pierson Andy Walker
Advanced Mass Properties Measurement	Sunday May 6	Paul Kennedy
Principles of Weight Management and Weight estimating Methods for the Offshore Oil Industry	Monday May 7	David Bennett
Aircraft Weight and Balance – Day 1	Monday May 7	Tom Oole
Basic Mass Properties Measurements	Monday May 7 – Morning	Wayne Clay
Aircraft Weight and Balance – Day 2	Tuesday May 8	Tom Oole
Automated Weight and Balance System (AWBS Software Training)	Wednesday May 9	Harold Smoot
Developing Basic Parametric Methods	Wednesday May 9	Andy Walker

All training class attendees will receive a course completion certificate with the appropriate Professional Development Hours (PDH). This is being done in order to assist trainees in meeting any necessary professional development requirements that they must meet.

See Page 28 for Training Registration Fees.