

SOCIETY OF ALLIED WEIGHT ENGINEERS, INC.



Aerospace • Marine • Offshore • Land Vehicle • Allied Industries



Montreal, Canada

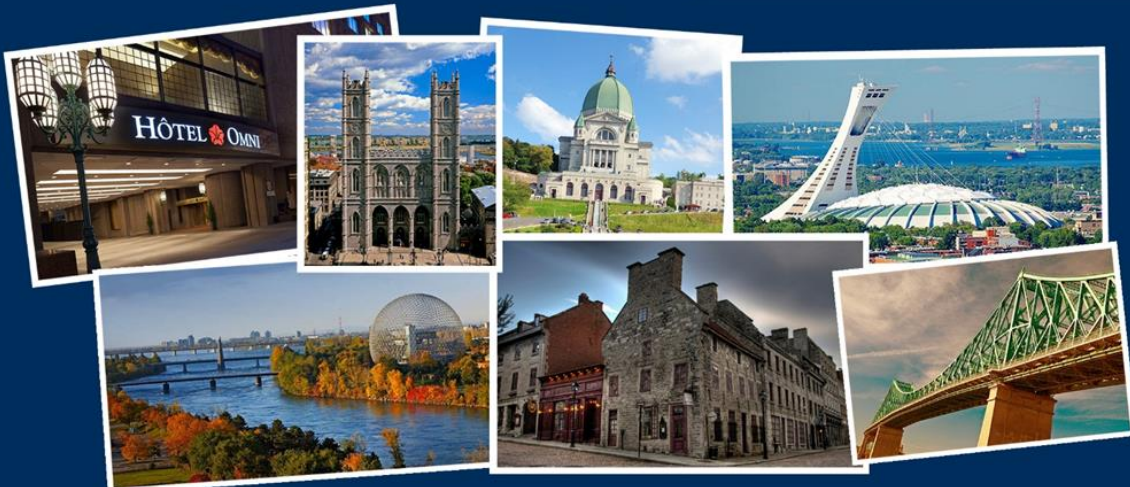


2016 SAWE Regional Conference
on Mass Properties Engineering

Nov.4-5, 2016

Hotel Omni Mont-Royal

AGENDA



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Meta MPE LLC

**SAWE - Canada Chapter
Regional Conference on
Mass Properties Engineering**

Nov. 4-5, 2016

Hotel Omni Mont-Royal, Montreal, QC



Conference Room: La Galerie (Lower Level)

Registration Desk Open : 8:00 am

Conference Start time : 8:45 am



Agenda: Nov.4, 2016

TOPIC	PRESENTER	START TIME
Welcome & Introductions	Rod vanDyk	8:45
“Destruction of a Dream, the Tragedy of Avro Canada and the CF-105”	Marc-André Valiquette	9:00
Intercomp		9:45
Aerodynamics Load Measurements on Airfoils	Dr. Hachimi Fellouah	10:00
Aventec		10:30
BREAK		10:45
Weight Optimization of a Landing Gear Steering Collar Using Tosca in Abaqus	Syed (Noman) Husainie	11:00
Ensinger		11:30
Aircraft Ditching and Safe Evacuation	Stuart Norris	11:45
Altair		12:15
An Error Propagation Analysis of Small Engine Mass Properties Measurements	Anthony Primozich	12:30
Evocast		13:00
LUNCH		13:15
Shipweight		14:45
Weight Control: Idealistic versus Reality	Alan Bird	15:00
Maya Simulation		15:30
The Secret Life of the Center of Gravity	Robert L. Zimmerman	15:45
BREAK		16:15
Mecanica Solutions		16:30
A Recommended Weight Margin Approach for Wet Undersea Vehicles	William Boze	16:45
UTC		17:15
Open Forum		17:30
CLOSE		18:00

Presentation Abstracts

Aerodynamics Load Measurements on Airfoils

(Presented by: Dr. Hachimi Fellouah, University de Sherbrooke, Department of Mechanical Engineering)

This project concerns the design of a three components internal aerodynamic balance. It can be used to measure the lift, drag and pitching moment in static or oscillating airfoils enduring air loads. The end objective is to study the complex unsteady 3 dimensional (3D) air flows interaction with airfoils. This interaction is often characterized by flow recirculation and massive flow separations that lead to reduction of both aerodynamic performance and structure fatigue. The Computer-aided design (CAD) of the internal balance will be presented. Finite element analysis (FEA), through ANSYS software, is used to assess the design before its construction. The result shows the good response of the balance to simulated air loads.

Weight Optimization of a Landing Gear Steering Collar using Tosca in Abaqus

(Presented by: Syed (Noman) Husainie, Aventec)

The adoption of topology optimization as a tool in the design cycle of a landing gear was tested using Tosca in Abaqus. The optimization process was carried out in collaboration with one of the leading landing gear manufacturers. To test Tosca's capabilities, a landing gear steering collar which was already in production and had previously gone through several phases of design iterations was used as the sample component. The steering collar weighed 35.155 lb before the optimization and there was little room for further material reduction largely due to multiple contact regions and multiple loading conditions. The analysis included multiple loading conditions such as oversteer, maximum spin up, and fatigue. Various manufacturing and geometrical conditions were also taken into consideration. Using a combination of CATIA, Abaqus, and Tosca, an optimized steering collar design was achieved with an approximately 19% reduction in mass when compared to the original design of the steer collar. The final mass of the redesigned steer collar was 28.521 lb. The results highlighted the benefits of optimization early in the design cycle in the aerospace industry.

Aircraft Ditching and Safe Evacuation

(Presented by: Stuart Norris, Bombardier Aerospace)

In the unlikely event of landing on water, the evacuation scenarios have to be considered, and the aircraft proven to float for sufficient time to enable safe evacuation of all occupants.

An Error Propagation Analysis of Small Engine Mass Properties Measurements

(Presented by: Anthony Primozich, USAF, President – SAWE International)

This paper investigates the impact of measurement error propagation on the accuracy of calculated weights and centers of gravity of small turbofan engines. Three variations of the two-load-cell crane-and-cable weighing technique were explored. The potential sources of measurement error were identified and analytical expressions for calculating the total error in the weight and center of gravity calculations were derived. A generic engine example was used to conduct a sensitivity analysis to illustrate the magnitude of error that could result from various weighing configurations. Results show that incorrect mass properties values can have an effect on modern aircraft flying qualities, such as fuel burn, aircraft handling, and trim.

Weight Control: Idealistic versus Reality

(Presented by: Alan Bird, Fincantieri Marinette Marine)

Often, the requirements for determining the mass properties of a ship are contractually established by the customer and design agent. In real life though in the shipyard, many of those requirements physically can't be done, are in themselves not accurate, or fall by the wayside due to cost and/or schedule factors. Even in some of the Recommended Practices, there are "requirements" that are not always obtainable. This paper will discuss several examples that can (and will) deter from what would be an "idealistic" weight control program.

The Secret Life of the Center of Gravity

(Presented by: Robert L. Zimmerman, Retired – Lockheed Martin Corporation)

In the world of mass properties, indeed in the world at large, the mass property that gets all the "press" is weight, or more correctly, mass. The unsung "hero" of mass properties, with at least as much influence as mass in the behavior of an object in a force field, is the Center of Gravity.

The Center of Gravity exerts its influence in myriad ways. This paper presents a compendium of manifestations of the effect the CG has on an object's behavior, some of which are surprising even to those who have studied the growing field of mass properties engineering. As a result, the authors put forth the proposition that the Center of Gravity should be raised from secondary importance to primary in the mass properties hierarchy.

A Recommended Weight Margin Approach for Wet Undersea Vehicles

(Presented by: William Boze, Newport News Shipbuilding)

Small "wet" undersea vehicles are very sensitive to weight and buoyancy changes. Thus, wet vehicles need the application of both an uncertainty margin for both weight and buoyancy prediction during the design development phase. Classical margin approaches for large dry submersibles vehicles do not address buoyancy uncertainty since the pressure hull (which provides the majority of the buoyancy) is established early in the design.

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Training Day (Saturday, Nov.5)

Conference Room: **Salon Automne (2nd Floor)**

Mass Balancing of Flight Control Surfaces (8am - 10am)

(Instructor: **Cviko Vidakovic**)

This short course will provide the basic theory behind the balancing of moving surfaces, flutter, and aeroelasticity. Discussion and demonstration of moving surface moment theory, requirements, suggested forms/log sheets, and review of existing SAWE reference material.

Basic Mass Properties Measurement (10:15am – 12:00noon)

(Instructor: **Jerry Pierson**)

This 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 or students who have never:

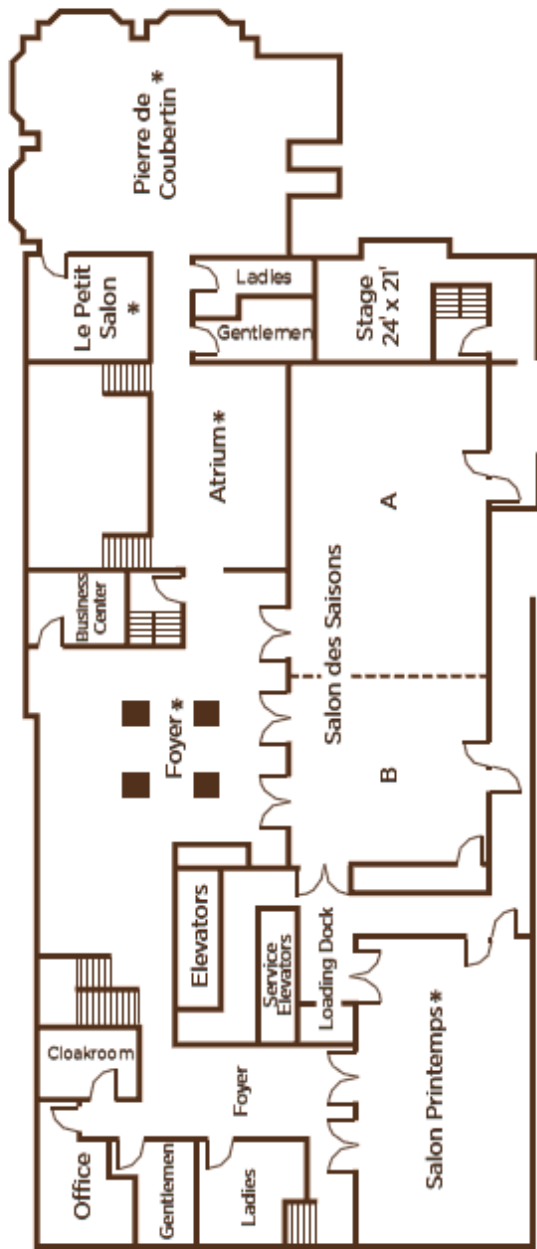
- Measured density of solids and liquids
- Measured center of gravity of vehicles
- Measured moments of inertia
- Measured ship center of gravity and had stability explained

Aircraft Fuel Calibration (1:00 pm – 5:00 pm)

(Instructor: **Jerry Pierson**)

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.

FIRST FLOOR



Conference / Vendor Space - Friday

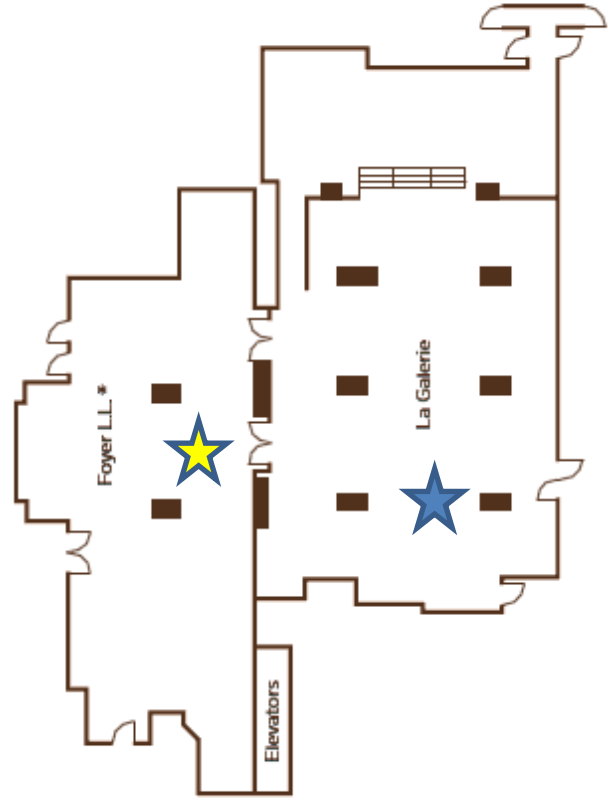
Breaks/Lunch area - Friday

Executive Board Meeting – Thursday

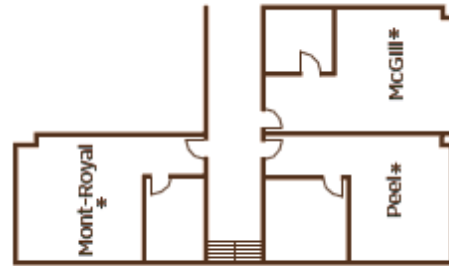
Training - Saturday

Break-out sessions - Thursday

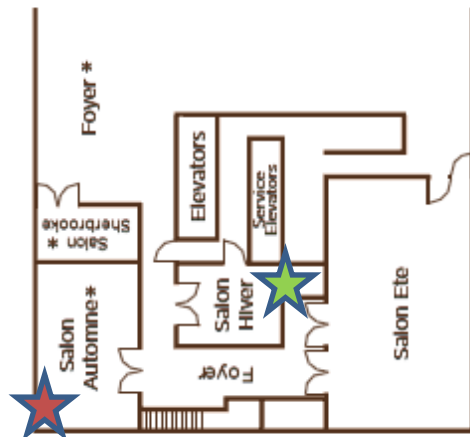
LOWER LEVEL I



THIRD FLOOR



SECOND FLOOR



* Natural Light



Friday Lunch: Universal PEEL (2055 rue Peel)