

The Canaveral Flyer

January 2007

A Newsletter of the Canaveral Section of ASME International



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Happy New Year Canaveral Section Members,

I hope everyone had a nice Holiday break and is ready to start a new year with ASME. Our December event featured the latest 3D imaging and rapid prototyping technology offered by Z Corp. Special thanks go out to Mark Kemper of Engineering and Mfg Services, Inc. for his excellent presentation and Chris Epler for coordinating the event.

As with many years past we will be holding our Annual Awards Banquet on January 24th to honor those members that have achieved 25 year, 50 year, or lifetime member status. Those members that will be honored at this event are listed below along with their membership status. Please join me in congratulating these members for reaching these milestones with ASME.

NAME	MEMBERSHIP YEARS
Vincent Cassisi	LIFE
Joseph Fechner	25
Joseph Glochick	25
Alva B Hom	50
Max Kandula	25
John Mason	25
David Poetker	25

February will bring us E-week where someone will receive the Tal Web award which is given to those individuals that have demonstrating a discernible devotion to space exploration. This past year's award was presented to retiring KSC director Jim Kennedy. Nominations for this award can be made by any member and sent to any one of the officers listed on this page.

I would like to say thank you to all of those individuals that participated, presented, and assisted in coordinating all of the events this past year and would also like to thank all of the Canaveral Section members for their continuing support of ASME. I look forward to the events we have planned for the coming months and hope to see you there.

Sincerely,

J.D. VanGilder

Schedule of Upcoming Events

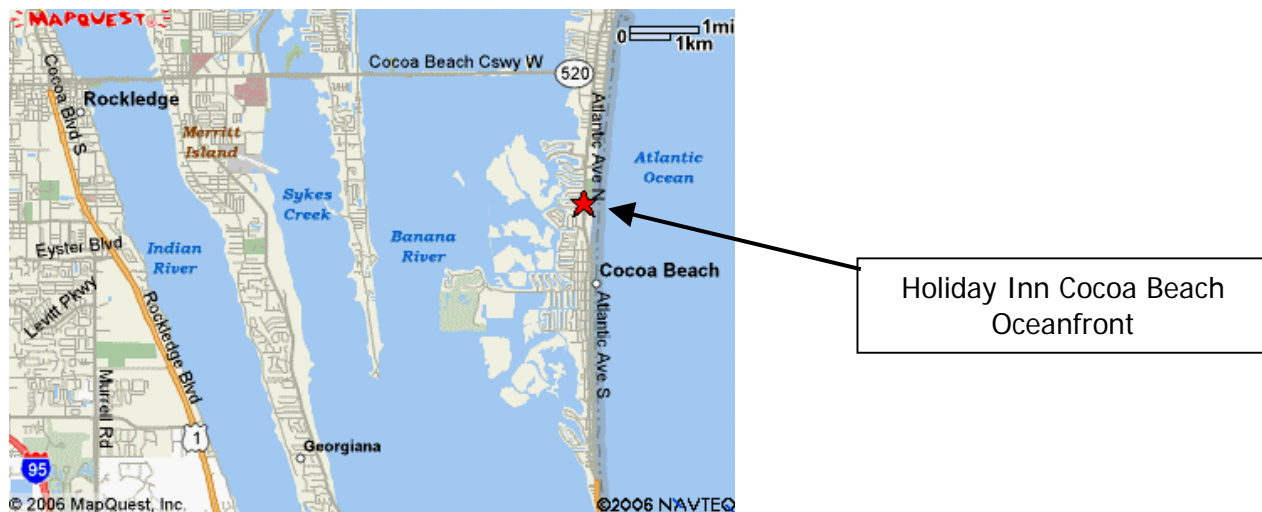
<u>Date</u>	<u>Event</u>	<u>Location</u>	<u>RSVP Date</u>	<u>Contact</u>
Jan 24	Annual ASME Section Awards Dinner Social 6:30PM Dinner 7:00PM (Chicken Marsala or London Broil) Awards Presentation 7:30PM Event cost \$20/member	Holiday Inn Cocoa Beach Oceanfront (1300 NORTH ATLANTIC AVENUE COCOA BEACH, FL 32931)	RSVP by Jan 19 th with your dinner choice.	J.D. VanGilder vangilderj2@asme.org Work 321-729-2678 Home 321-768-1724
Feb 17	Submission of nominations for Tal Web Award are due	N/A	Feb 17	Email any of the Canaveral Section officers
Feb 23	CCTS Engineers Banquet	Florida Tech	TBD	TBD
Feb 18 - 24	E-week	TBD	TBD	TBD
Mar 14	*tentative* Phil Scarpa, Astronaut Physician at KSC	TBD	TBD	TBD
Apr 27, 28, 29	Space Congress – focusing on the young engineers of tomorrow	TBD	TBD	TBD

What's Happening at Florida Tech:

If you have any questions about Student Section events or meetings contact J.D. VanGilder at vangilderj2@asme.org

Local News:

United Launch Alliance - Boeing and Lockheed Martin have completed the transaction combining their expendable launch vehicle businesses, forming the joint venture called United Launch Alliance. The alliance will combine the production, engineering, test, and launch operations associated with U.S. government launches of Boeing Delta and Lockheed Martin Atlas rockets. The proposed joint venture was first announced in May 2005.



Fracture Mechanics Basics

To non-technical folks, the term Fracture Mechanics might as well be lumped in with topics like Quantum Physics or the notion of Parallel Universes, relegated to the post-midnight slots on the Science Channel. Even for the mechanically inclined and / or educated, if you haven't taken a college course on the subject or if you haven't been exposed to it, you may not know what it is or how it is applied to the real world. In theory, it is simple - it is the study of how fractures initiate and propagate through objects. This can be a useful tool for engineers when they are trying to determine how long an object, when subjected to loads (steady and vibration), can last before a crack will propagate to the point where the part fails. This is usually referred to as a safe-life. There is usually a healthy margin of safety between the calculated safe life and the recommended operational life of the object, as Fracture Mechanics is by far an exact science.

There are number of things that go into a FM analysis: material fracture properties, steady and vibrational loads, thermal loads, and an assumption of an initial crack or defect size. For cast parts, the initial crack size may be the largest assumed porosity inclusion. For a welded structure, it may be an assumed crack a welded joint. It can even be a scratch from an exacto blade (see article below)! The best way to determine the initial flaw size is via Non-Destructive Evaluation (NDE). There are various techniques available that can identify cracks or crack-like features (magnetic particle, ultrasonics, etc), and use of each are based on material types / geometries, and a probability of detection. All these techniques must be performed by trained and qualified personnel.

Once the initial conditions and environments are known, the calculation of crack growth can be performed using equations and techniques based upon elasticity theories. Practically speaking, this usually involves a finite element or boundary element software and an experienced FM analyst. The end result is a determination of a maximum time duration or load cycle before the part failure. It should be noted that the inputs themselves have various levels of variability and error, which can be compounded via the computational techniques. Thus, the recommended safe-life of the object usually will be reduced by a substantial percent from the calculated safe-life.

Fracture Mechanics has only been around since the 1920s, and the techniques for ductile materials were not available until the 1940s – the field is in its infancy. Developments in NDE, computational, and material characterization techniques will help Fracture Mechanics become more accurate and reliable. As with most analysis techniques, it requires cost/benefit evaluation before an attempt is made at applying it your part, product, or program. The article below exemplifies how a minute defect in a part can propagate into potential disaster.

Letter to the Editor of a recent Mechanical Engineering Trade Magazine:

One day the main rotor blades of a military helicopter we made were partially unpinned and folded back along the fuselage after a mission off an aircraft carrier, as was the routine. In the process, one of the blades broke neatly at the cuff attachment point and fell to the carrier deck.


Everyone was dumbfounded. Naturally, a thorough investigation ensued. During hover at the approach to the carrier deck, there is substantial compressive stress on the top surface of the blade. A fatigue crack had developed at the top root, but it was kept closed by the compressive stress. When the craft was parked, the blade was no longer stressed in a way to keep the crack closed. So upon blade folding, enough tension developed at the crack to make the blade snap.

The fatigue crack was a nice clean brake right along the attachment cuff, to which the blade was adhesive bonded. Further investigation showed that a scribe mark had been placed along the edge of the cuff. This mark eventually grew into a fatigue crack.

Now the question was: Why was there a scribe mark on the blade? It turned out that an enterprising worker in the blade shop didn't like the way the adhesive oozed slightly beyond the cuff and out onto the blade surface. The excess adhesive looked a bit messy and created the impression that the utmost workmanship had not been used building the blades. So he took it upon himself to use an Exacto knife to trim the excess adhesive away. In so doing, he was unaware that he was scribing an infinitesimal scratch in the blade. The scratch is what grew into a fatigue failure.

Well, talk about a product recall. All blades built around that time had to be inspected, and the company put out an engineering bulletin for blending out any scratch found. And as a further preventative measure, a rule was established prohibiting any unauthorized sharp objects in the blade shop.

Thanks to our sponsors!



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