JOURNAL of SPACE SAFETY ENGINEERING

Volume 2 No. 2 - December 2015

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AIMS and SCOPE

The Journal of Space Safety Engineering (JSSE) provides an authoritative source of information in the field of space safety design, research and development. It serves applied scientists, engineers, policy makers and safety advocates with a platform to develop, promote and coordinate the science, technology and practice of space safety. JSSE seeks to establish channels of communication between industry, academia and government in the field of space safety and sustainability.

MAIN JSSE TOPICS

- Safety by design
- Safety on long duration missions
- Launch and re-entry safety
- Space hazards (debris, NEO objects)
- Space weather and radiation
- Environmental impacts
- Nuclear safety for space systems

- Human factors and performance
- Safety critical software design
- Safety risk assessment
- Safety risk management
- Organizational culture and safety
- Regulations and standards for safety
- Space-based safety critical systems

- Space Situational Awareness
- Space traffic control
- Space traffic and air traffic interfaces
- Space materials safety
- Safe & Rescue
- Safety lessons learned

Publication information: The Journal of Space Safety Engineering (ISSN Pending) is a quarterly publication of the International Association for the Advancement of Space Safety (IAASS). You can read about IAASS mission, goals, organization, membership and activities at: http://iaass.space-safety.org. The JSSE is published using an open access publication model, meaning that all interested readers are able to freely access the journal online without the need for a subscription, and authors are not charged.

Authors inquiries: For inquiries relating to the submission of articles please contact the Editor-in-Chief at: jssepub@gmail.com. For all information about the journal, please visit the journal web page http://iaass.space-safety.org/publications/journal/. Authors instructions on preparation and submittal at: http://iaass.space-safety.org/wp-content/uploads/sites/24/2013/07/JSSE-authors_instructions.pdf.

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International Association for the Advancement of Space Safety
Lockheed Martin is the prime contractor building the Orion Multi-Purpose Crew Vehicle, NASA’s first spacecraft designed for long-duration, human-rated deep space exploration. Orion will transport humans to interplanetary destinations beyond low Earth orbit, such as asteroids, the moon and eventually Mars, and return them safely back to Earth. This state-of-the-art spacecraft provides solutions that are extensible to future missions, and focuses first and foremost on crew safety:

- Accommodates a crew of up to six astronauts
- Provides safe ascent abort with no black zones
- Enables safe abort opportunities during all mission phases
- Withstands re-entry at speeds greater than 20,000 miles per hour

1. SOME DEEP-SPACE DESIGNS ARE CLASSIC FOR A REASON

Thankfully, we’re guided by 50 years of NASA’s investment in human spaceflight. You might note that Orion’s shape hearkens back to Apollo. That’s because every aspect of Orion’s design is driven by crew safety, and the laws of physics are the same today as they were in 1960. That’s the shape that has been proven to work best for high-velocity returns from deep space. And just as lessons learned from previous NASA missions help guide Orion’s design, over 500 products resulting from Orion’s development have been shared with commercial space companies. An example of what’s new is Orion’s launch abort system (LAS). On deep-space missions, mass is king. Any extra weight takes away valuable mass required for micrometeoroid protection, radiation protection and life support needed to keep astronauts safe beyond low Earth orbit. So about six minutes into launch, the LAS is jettisoned to save mass. While there are other ways to build a LAS, our design trade studies repeatedly highlighted the advantage of not carrying extra weight past the time it is needed.

2. CREW SAFETY IS BUILT IN, NOT BOLTED ON

Every component — from the heat shield and the flight computers to the fundamental systems and structure of the spacecraft — is designed for the rigors of deep space: Orion’s seats are designed to help prevent loss of consciousness as astronauts experience up to 5 Gs during re-entry. The cooling system keeps the crew cabin at 25 degrees Celsius despite the more than 2,000-degree heat of re-entry. The built-in stowage lockers double as a safe haven during dangerous solar activity. The life-support system is highly reliable and is sized not only for basic functions but also to allow the crew to exercise, which is critical for long stays in zero gravity. Computers and avionics have multiple backups and are designed to self-correct in the event of a failure. Crew module tiles are designed to protect from the inevitable micrometeoroid strikes the craft will face during long-duration missions.

Michael Hawes

EDITOR’S NOTE

This article is an extract from an editorial by Michael Hawes published by Space News in June 2015 with title “Three Things Orion’s First Flight Taught Us”.

Dr. W. Michael Hawes is Orion program manager for Lockheed Martin Space. Michael Hawes is board member of the International Space Safety Foundation (ISSF).
The 8th IAASS International Space Safety Conference “Safety First, Safety for All”, will be held in Melbourne - Florida (USA) in the period 18-20 May 2016. The IAASS conference is the premiere international forum dedicated to the discussion of a wide variety of space safety topics.

The conference offers a unique opportunity to meet top U.S. and international experts in space safety and related engineering fields, from industry, academia and agencies. An occasion for exchanging views and establishing new professional bonds, towards the common goal of forging and a global space safety culture.

The online registration is open. You can access the online registration form at http://iaassconference2016.space-safety.org/registration/ or directly by clicking the red tab at the bottom of this page. Early Birds registration ends 14 March 2016.

**CONFERENCE MAIN TOPICS**
- Designing safety into space vehicles
- Safety on long duration manned missions
- Safety of extravehicular activities
- Launch safety
- Space debris remediation
- Re-entry safety
- Human spaceflight payloads safety
- Nuclear safety for space systems
- Human factors and performance for safety
- Safety critical software design and IVV
- Safety risk management
- Probabilistic risk assessment
- Organizational culture and safety
- Regulations and standards for safety
- Space-based safety critical systems
- SSA & Space traffic control
- Operations safety
- Space materials safety
- Commercial human spaceflight safety
- Lessons learned
- Safety Management System
- Space Weather Hazard
- Launch and In-Orbit Collision Risk
- NEO Hazard

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At the occasion of the Conference Gala Dinner on May 19, 2016 the IAASS will assign three awards:
- Jerome Lederer Space Safety Pioneer Award
- Vladimir Syromyatnikov Safety-by-Design Award
- Joseph Loftus Space Sustainability Award

These prestigious awards are a means to honor and recognize safety professionals and systems designers and engineers who have made outstanding contributions towards space safety.
Progress in space safety lies in the acceptance of safety design and engineering as an integral part of the design and implementation process for new space systems. Safety must be seen as the principle design driver of utmost importance from the outset of the design process, which is only achieved through a culture change that moves all stakeholders toward front-end loaded safety concepts. Superb quality information for engineers, programme managers, suppliers and aerospace technologists.

Space Safety Regulations and Standards is the definitive book on regulatory initiatives involving space safety, new space safety standards, and safety related to new space technologies under development. More than 30 world experts come together in this book to share their detailed knowledge of regulatory and standard making processes in the area, combining otherwise disparate information into one essential reference and providing case studies to illustrate applications throughout space programs internationally.

Safety Design for Space Operations provides the practical how-to guidance and knowledge base needed to facilitate safe and effective operations safety in line with current regulations. With information on space operations safety design currently disparate and difficult to find in one place, this unique reference brings together essential material on: safety design practices, advanced analysis methods, and implementation procedures.