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ZOOM

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PER ASPERA  AD ASTRA



Supersonic Green Machine - this future aircraft design concept for supersonic flight over land comes from the team led by the Lockheed Martin Corporation. This concept is one of two designs presented in April 2010 to the NASA Aeronautics Research Mission Directorate for its NASA Research Announcement-funded studies into advanced supersonic cruise aircraft that could enter service in the 2030-2035 timeframe.

Photo: NASA/Lockheed Martin Corporation

The Latin saying “per aspera ad astra” (through hardships to the stars) implies that the road to achieving sophisticated goals is not easy. However, every road and even a tiny path are there for us to walk... When Jules Verne wrote his book “From the Earth to the Moon” in 1865, the idea of building a “space gun” in which one could travel to the Moon was nothing more than science fiction. Nevertheless, on July 20, 1969, a little over one hundred years later, Apollo 11 landed the first humans on the surface of the Moon.

Traveling our galaxy like we travel the world today may be closer than we think. The NASA Space Shuttle Program has been in existence since 1981. Each and every mission - and there have been over 130 of them so far - has brought us closer to the future of space travels by discovering new possibilities, testing new technologies, and finding new solutions. A space shuttle - “the world’s first reusable spacecraft that launches like a rocket, maneuvers in Earth orbit like a spacecraft and lands like an airplane” - brings us all closer and closer to space journeys.



George Zamka (State Dept. photo)

A Window on Space: Interview with Commander George Zamka

Commander of mission STS-130, George Zamka, and his five-person crew delivered to the International Space Station, among other items, a seven-windowed cupola, a “window on space.” Until then, the ISS staff needed outside cameras to get the magnificent views of the Earth we all know and admire. The cameras will continue to be used, but it appears that for a human being nothing can equal a simple look out the window to get the picture of what’s going on. Thanks to people like George, humans in space feel more and more at home. As he himself predicts: “There’s going to be a future where space travel between worlds is as common as airplane travel today.”

Today George Zamka talks to *Zoom In On America* about his adventures in space.

Zoom: In an interview, which was featured in Zoom in December 2008: (www.usinfo.pl/zoom/files/December2008/december2008.pdf), you said that you are hopeful to get one of the last shuttle missions to fly. And you did. You were commander of the STS-130 in February 2010. Has this been the most important flight in your life so far? Were you able to accomplish all goals?

George Zamka: Yes. The STS-130 flight has been the greatest flight in my life. I had a great mission, a tremendous crew, and the most amazing machine in the world to fly. We did get all of our goals accomplished, although not without some drama. We had a concern that one of our micro-meteor protection blankets would cause interference as we tried to berth the Cupola to its home. This would have caused a big change to our mission. Fortunately the interference was not as bad as we thought. It is the teamwork needed to resolve these problems that always makes the missions memorable and rewarding.

Zoom: Within NASA’s Space Shuttle Program you flew Discovery (in 2007 – STS 120) and Endeavour (in 2010 – STS 130.) How do these two shuttles compare in the hands of a pilot and commander?

G.Z.: The two vehicles are very similar, with perhaps only small changes in readings we’ll see on our gauges and maybe some minor accepted deviations in how the systems function, but that’s it. The far greater difference for me was in my role as pilot for one mission, then commander for another. As a pilot it was my first flight and I wanted to do everything that I was responsible for in a flawless manner. Things I didn’t know so well, I learned, for instance the functioning of some of our photographic equipment. As a commander I was responsible for the entire mission, so it was my job to ensure that my whole crew had everything that they needed to succeed, and that they were all up to the task. Another big difference was in the flying of the shuttle. On Discovery, as a pilot I got to fly the shuttle during its undocking from the space station. As commander on Endeavour, I got to fly the rendezvous and the final landing on Earth. Two different assignments but both were very exciting!

Zoom: You have a degree in Mathematics and in Engineering Management, but your professional career is a pilot. Was that a conscious choice or a coincidence?

G.Z.: They were separate considerations. I chose Mathematics to study in college because it was a general skill I could apply to engineering, medicine, or almost anything. In my studies I learned about constants, variables, and functions, or relationships between different things. It is a great way to think about many things and solve problems. Engineering Management was a choice of mine so that I could learn the discipline of making things with limited resources. Flying was an avocation that was available to me when I joined the Marines. One of my uncles, a fun guy, was a pilot and I wanted to fly like he did.

Zoom: In 1998 NASA selected you as a pilot. Did you expect an offer like this? Did you consider turning it down?

G.Z.: I was hopeful that NASA would ask me to join them, but not at all expectant. There were many qualified applicants including many who I felt were more qualified than me. So, I was happily surprised when I received the call from NASA. And no...I did not consider turning the offer down!

Zoom: With time running short for the space shuttle program – there are only two missions left – what have the gains and losses been of the program so far?

G.Z.: Well, the losses have been 14 wonderful human beings who inspired us all by daring to break the bonds of earth and perform research in space. The gains are all around us. So much so that we don’t even notice anymore. Because of the access to space that we have been afforded during the life of the shuttle program, we have communications via satellite, global positioning, a digital data base of the world’s terrain, views of the universe that exceed imagination, and a space station flying overhead at 8 kilometers per second. Try to imagine what the world would be like if those things suddenly weren’t there anymore, and you can see the influence that the shuttle has had on our lives.

Zoom: What plans do you have for the future?

G.Z.: I am going to assist the shuttle program and my fellow astronauts in a support role until the last shuttle lands safely. After that there will be new challenges and adventures that will call, and who knows what else is out there?

Zoom: Thank you for the interview!



STS-130 liftoff (Photo: NASA by Tom Farrar and Tony Gray)

“10 .. 9 .. 8 .. 7 .. 6 .. 5 .. 4 .. 3 .. 2 .. 1 .. Liftoff!”

February 8, 2010, 4:14 a.m.

Kennedy Space Center

It is a great experience to see the astronauts off at the Kennedy Space Center. Families and invited guests travel, sometimes from afar, to see the launch of the space shuttle. Sometimes they have to stay a day or more longer when due to atmospheric conditions or to some technical problem detected at the last moment the launch is delayed.

Susan Parker-Burns was invited with her family by George Zamka to observe the launch of Endeavour on February 8, 2010. This is her account.

The drive to Florida took 14 hours from Washington DC, but the kids handled it fine, and of course the road is pretty easy. We got to NASA's Kennedy Space Center in time to have a special pre-briefing that included a video featuring George Zamka and an explanation about the Tranquility module. This module has windows on all sides and would be attached to the International Space Station during Endeavour's shuttle mission. Then it was off to our hotel for some rest before we had to be back at the Kennedy Space Center at 1:30 am. Guests must take buses out to one of three viewing areas for their launch. We were at the Banana Creek site, which is 3 ½ miles away and is the closest viewing point. The launch was called off the first night 20 minutes before the 4:30 am scheduled liftoff time because of cloud cover. Apparently NASA regulations say that clouds can't be lower than 5,000 feet at a launch. The space shuttle has to be able to turn around and land if there was an emergency. Even though there was just a little low cloud hanging over the launch pad, NASA weather experts called off the launch, so we stumbled back onto the

buses at 4 am, then into our cars and sat in traffic for 3 hours to get back to the hotel.

After some sleep, we came back and repeated the same bus ride to the viewing area the next night. Fortunately the weather cooperated! It was freezing cold for Florida, about 5 degrees Celsius and windy, so everyone was bundled up. NASA had an audio feed so we could hear the Command Center in Houston communicating with the shuttle, and since George Zamka was the commander, we heard him speaking on behalf of the shuttle crew. The girls really liked that. The launch itself went right on time at 4:14 am. The shuttle ground crew first released water to suppress the sound right before liftoff, and then up went Endeavour. For a minute, the sky was so bright it seemed like daylight. The noise at shuttle liftoff is a deep rumble that shakes the ground, and that you can feel in your chest. Within two minutes the shuttle was out of sight. Quick but an absolutely amazing sight and one we won't forget!

The United States Space Shuttle Program - History & Facts:

STS is an abbreviation for the Space Transportation System, which is the name of the overall shuttle program. Each mission is designated with an STS number. On November 1, 2010 a new mission on board Discovery space shuttle - the STS-133 - will begin. Next year on February 26, 2011 Endeavour will take off from the Kennedy Center in Florida. This 134th space flight will conclude the program that has been running continuously since April 12, 1981. In addition to building the International Space Station, the program had many other objectives, for example:

- Testing remote manipulator system,
- Collecting data on near-Earth space environment,
- Performing medical test experiments,
- Taking photos,
- Deploying communication satellites,
- Performing space walks
- Conducting biofeedback experiments such as studying affects of space on behavior of animals in zero gravity.

For more information on past and future shuttle missions, visit the NASA website at http://www.nasa.gov/mission_pages/shuttle/main/index.html

Activity Page

Exercise 1: Vocabulary

There are three components that make a space shuttle:

1) the orbiter; 2) two rocket boosters; and 3) the external tank.

Read the definitions a-c and decide which of the words above each describes:

a. The brains and the heart of the space shuttle, it contains the pressurized crew compartment (which can normally carry up to seven crew members), the huge cargo bay, and the three main engines mounted on its aft end.

b. The “gas tank” that contains the propellants used by the Space Shuttle Main Engines, the only part of the space shuttle that is not reusable and is jettisoned 8.5 minutes into the flight.

c. They operate in parallel with the main engines for the first two minutes of flight to provide the additional thrust needed for the orbiter to escape the gravitational pull of the Earth. At an altitude of approximately 45 km (24 nautical miles) they separate from the rest of the shuttle, descend on parachutes, and land in the Atlantic Ocean.

(Based on the NASA website)

Useful link: A collection of short videos showing how things work on board a space shuttle can be found on the NASA website at <http://www.nasa.gov/returntoflight/multimedia/index-how-it-works.html>

Exercise 2: Composition

Science fiction only needs more or less time to become science... Do you remember “Star Wars” and the friendly robots R2D2 and C3PO? Well, here is Robonaut 2 which will be launched in November 2010 to become a permanent resident of the International Space Station. Read the text below that appeared on the NASA website:

Robonaut 2 is being prepared for its history making launch to the International Space Station on STS-133. The robot, known as R2, will be the first humanoid machine to work in orbit. With a upper torso, long arms and a suite of cameras and sensors, Robonaut 2 is programmed to help astronauts living on the space station by performing repetitive tasks. It's hands and fingers are able to operate buttons and switches found inside the space station. R2 is a great leap forward for robotic technology that is not lost on the creators and actors that gave movie audiences the fictional worlds of “Star Wars” that saw droids and humans working-side-by-side.

- 1) Imagine that you are Commander of STS-133. Using the above text, write a brief plan on how you are going to carry out the task. Include a short description of the robot's first activities on the ISS.
- 2) If you had a home robot, what tasks would you assign to it?

Exercise Key: http://hungary.usembassy.gov/quiz_key.html

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online at**

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**Robonaut 2
Readied for
Launch**

This NASA video introduces and tells the story of the first humanoid robot.

(Click on the image or follow the link below.)

http://www.nasa.gov/multimedia/videogallery/index.html?collection_id=14554&media_id=17780055