

Progress spacecraft, contain items like pictures, snack foods and handwritten cards and letters.

Care packages take on extra significance around the holidays, when they often contain festive, personalized Christmas stockings for each crew member.

Nancy “Tad” Young, administrative associate with the group, said that this tradition began in 1989 in the Krug (now Wyle) Softgoods Lab. The stockings were made from Nomex, a colorful and fire-resistant fabric, but the team members knew they needed a little something extra.

“I was asked to paint on them with flight-approved Sharpie markers,” said Young, who has added her artistic flair to the stockings ever since. She creates a drawing on paper—trying not to duplicate any past designs—then paints it on a stocking and adds the crew member’s name in English or Russian.

While the stockings are certainly keepsakes, it just wouldn’t be right to send them up to space empty. The Group stuffs them with small treats and gifts, including items from the astronauts’ families, adds a Velcro closure and sends them up on the flight closest to Christmas. STS-116 will do the honors this year.

Astronauts and cosmonauts also deck the “halls” of the space station with a custom-designed Nomex Christmas tree, which was delivered by STS-112 and is reused each year.

Young said she enjoys being a part of these unique traditions.

“The crew members are away from their families at holiday time,” she said, “and it just tickles me to think that the personalized stockings I paint could possibly bring a little smile.”

The gifts may arrive through an airlock instead of a chimney, but the spirit remains the same. The same present-opening rules apply, too.

“We put a note on them that says ‘Don’t open till Christmas,’” said Avina. “Hopefully they won’t peek.”



Above: Astronaut William S. (Bill) McArthur Jr., Expedition 12 commander and NASA space station science officer, poses with Christmas decorations in the Destiny Laboratory of the International Space Station.



Every year, the team sends up Christmas stockings like these, decorated by Nancy “Tad” Young.

Opposite page: It’s not often that Santa hats and short-sleeve shirts are worn together, but the STS-103 crew members felt quite natural blending the two onboard the Space Shuttle Discovery. In front are (from left) astronauts Claude Nicollier, Scott J. Kelly and John M. Grunsfeld. In the rear are (from left) Steven L. Smith, C. Michael Foale, Curtis L. Brown Jr., and Jean-Francois Clervoy. Brown and Kelly were commander and pilot, respectively. All the others are mission specialists, with Smith serving as payload commander.

THE HABITABILITY DESIGN CENTER MAKES REALITY...

What the mind conceives

By Catherine E. Borsché

Avivid imagination tops the list of required job skills for the team that works in the Habitability Design Center (HDC) at Johnson Space Center. On any given day, you can find HDC team members doing computer-aided design, drawing rough sketches of a future lunar rover, creating a wooden spaceship mockup or trying to simplify a graph for a future crew's instruction manual. The team takes what is only a grandiose idea and turns it into something concrete for engineers to work with.

The group, comprised of aerospace architects, resides within the Habitability and Human Factors Branch. Its biggest challenge is incorporating the human element into futuristic engineering designs for extreme environments.

"It's just a great era right now to be a conceptual designer at NASA, because you have all these new vehicles that we're building. There are a lot of eras where this team might have been bored, but right now is a good time for industrial designers and architects to be here," Rich Szabo, Human Factors design engineer, said.

"What we have been tasked to do is to try and really get human factors incorporated into the engineering design processes," Evan Twyford, aerospace

architect, said. "Traditionally the human element hasn't been treated as its own subsystem, and I think that's one of the (really) important things we have been trying to accomplish. We want human requirements up to the same level as environmental control, avionics and all the other stuff that goes into the building of a spacecraft or living quarters."

One of the main goals of the team is to create a product or an environment so seamless that it does not detract from the actual task an astronaut would perform.

"We're all about maximizing efficiency through design. We look at the actual architecture of the interior and where things are located, such as stowage or instrumental controls," Twyford said.

"We're unique from any other design group here at JSC, or across NASA, because we're focused on using human factors as a design tool," Szabo said. "Other design teams generally reside within an engineering directorate environment, where it's all about meeting requirements. But we try to have a different focus and combine design skill with human factors knowledge."

When it comes to perfecting its designs, the HDC team thinks in more abstract terms. Not only do its members value simplicity and function, but they are also



cognizant of the "wow" factor.

"Our secondary objective is to create anticipation by presenting cool solutions, so whether the public is seeing the image in a magazine or in a news article or on the Internet, it's something that can excite the mind," Chip Conlee, aerospace architect, said.

Szabo had his own analogy for their creative process.

"It's the same as taking a basic product like a shopping cart and creating something that not only is a great design, but also viscerally looks cool, so you are eager to use it. We want to get people enthusiastic about this hardware and some of the space vehicles again—and not just create cut-aluminum, boring, inside-of-a-Boeing airplane-type interiors," Szabo said.

Habitability Design Center and Lunar Lander team members discuss vehicle internal architecture.



Habitability Design Center team members, from left to right, are Rich Szabo, Garrett Finney, Robert Howard, Evan Twyford and Chip Conlee.

To get its plans implemented into reality, the team works with a variety of groups across NASA, many of which are integrally involved with engineering.

“Typically we are brought in pretty early in the process. We provide a lot of conceptual design solutions, and I think one of our big strengths is the ability to come out with a lot of really good ideas and drawings to help the engineers work through these concepts before anything gets too set in stone,” Twyford said.

The HDC team is working on the cutting edge of new exploration goals. A big project that the team recently completed was a lunar lander study with Architecture Habitation Integration. The aim of this intense, 12-week project was to create a lunar lander concept with fuel tanks that could be purged after a lunar landing and outfitted for habitation inside of the tanks. The crew of the lunar lander would essentially attach all the spent tanks together and then use the old tanks as an outpost. The HDC team did a lot of the conceptual design work and built mockups for the task.

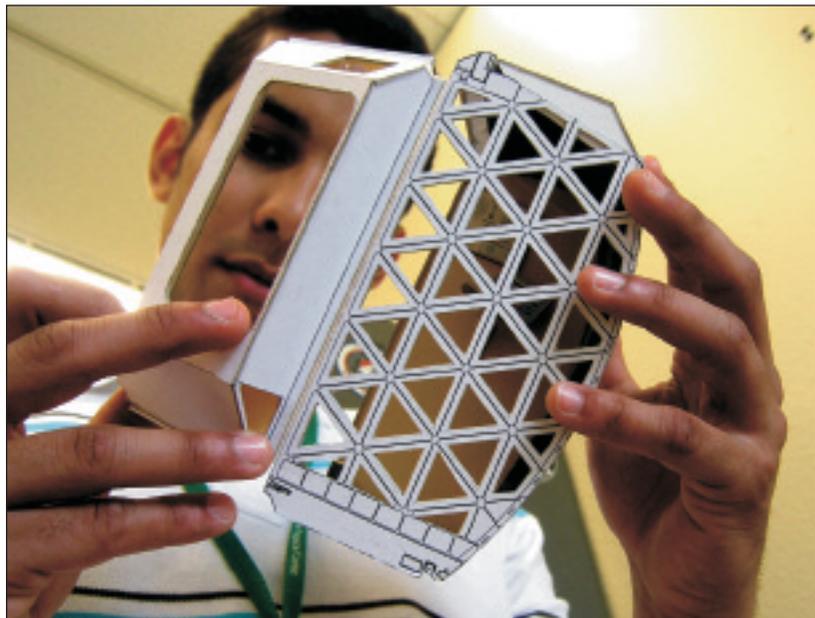
The HDC team also built a Crew Exploration Vehicle mockup for evaluation, and now its members are moving on to other stimulating projects—potentially a lunar rover.

The team is currently working on a project with a tighter-than-normal timeline for completion.

“We’re also working the Crew Quarters Project for the International Space Station. The Crew Quarters element is scheduled to fly in about a year and a half and just went through a 10-percent design review,” Szabo said. “So we do work on actual hardware that’s going to fly rather soon and is going through its critical design review. Our team is capable of going past that early design comfort zone and staying with it through its core design reviews.”

Boredom is never a concern for the HDC team, as its members relish the unique experiences they have on the job.

“It’s exciting to be on the ground level of where the really innovative stuff is happening at NASA and to be able to go home and read in magazines about what NASA’s plans are, and then see the project you’ve been working on for months—it’s just really cool,” Twyford said.



Top photo: *Chip Conlee, aerospace architect, evaluates the displays and controls configuration inside the ascent vehicle.*

Above: *Early in the design process, the Habitability Design Center generates scale models to make engineering concepts tangible to the NASA community.*



The X Prize Cup encourages space entrepreneurs

The spaceflight faithful made their pilgrimage to the New Mexico desert for the second annual X PRIZE Cup—a metaphorical Mecca for fans of commercializing space transportation and tourism.

Following an executive summit of the world's visionaries and leaders in science, exploration and technology, the two-day event in late October filled the Las Cruces skies with rocket launches, aircraft fly-overs and space competitions.



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