Human Factors in Art: Designing for NASA

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Suitlock by RISD students

NASA and the Rhode Island School of Design (RISD) might seem at first to be strange bedfellows. But after talking to Michael Lye, a Senior Critic in Industrial Design and the NASA coordinator at RISD, the collaboration makes perfect sense for both parties.

Lye teaches the *Design for Extreme Environments* course at RISD, in which design students, in partnership with NASA and the Rhode Island Space Grant, help create space exploration vehicles and habitats that optimize the safety, productivity and well being of human explorers. NASA is home to some of the best engineers in the country, but there is a growing interest in reaching out to other professions for alternative approaches.

That's where industrial design comes in. According to Lye, one of the most valuable contributions of designers is that they think differently than engineers. "The engineers at NASA are so used to thinking about the constraints that they have to deal with that they sometimes miss a fresh approach or a new way of thinking," says Lye. "The design students start out asking, 'What *can* we do?' and then figure out how to make those ideas work within the constraints. It's a little naïve, but naïve to a useful end: let's imagine everything, and then see what's possible out of that."

One of Lye's recent projects in the Extreme Environment courses demonstrates the rich possibilities NASA and RISD can come up with when working together. When astronauts first went to the moon, they discovered that everything was

covered with fine grains of crystalline dust formed from meteor impacts. The dust stuck to their space suits and was tracked back into the spacecraft. NASA realized that if humans ever want to spend a significant amount of time on the moon, these fine particulates could pose serious health hazards if inhaled and could also wreak havoc on sensitive mechanical and electrical equipment. To mitigate the dust problem, NASA was considering some sort of suitlock device to keep the dust outside while still allowing the astronauts access to the lunar surface. The design was a rear entry space suit that remains permanently mounted on the outside of the habitat. Lye and his design students considered the challenge this posed to astronauts as they climb into or out of the suit inside the tightly constrained environment of the habitat.

The final designs demonstrated two different configurations for the suitlocks and bulkheads that separate the harsh lunar environment from the safety of the habitat. The astronauts can quickly and easily don the suit from inside the habitat, but the suit – and any dust attached to it – remains outside. Lye and his team mocked-up the space suit to understand the dynamics and human factors of the process and experience getting in and out of it, and standing and trying to move in it. The students created two full-size structures and sent them to NASA headquarters in Houston for the engineers to evaluate. The feedback has been positive.

In creating the suitlock and other projects for NASA, Lye is aware of the difference in the ways that engineers and designers evaluate ideas and prioritize different aspects of a project. He says, “While we have to make sure this thing is structurally sound, it’s not our first priority. Our first priority is the safety and well-being of the crew while making it easy and simple for people to use.” Designers work while keeping in mind how people interact with the environment around them, incorporating psychology, ergonomics, art, engineering and technology into their final product.

This approach reflects Lye’s view of the field of industrial design. He thinks of industrial design as living on the boundary between art and engineering. “It’s applied creativity, in some respects,” he says. “It’s figuring out what people want or need even if they can’t articulate it themselves. It’s using creativity to find

solutions to difficult problems." The creativity that is inherent in art is one of the essential ingredients in industrial design as it's taught by Lye.

Lye's enthusiasm for this partnership with NASA is obvious as he talks about why he continues to teach the *Design for Extreme Environments* course. He studied physics at Johns Hopkins before pursuing a career in industrial design and appreciates that he can incorporate his interest in science into his work as a designer and teacher. Although the curriculum might seem specific to NASA, the process of creating is similar in any good design project. Most importantly, Lye enjoys figuring out solutions that may help astronauts live and travel in space safely and more comfortably. As Lye says, "It's fun to work on real-world projects, even of they're not of this world."