

# A Physics Bender

**MPC balanced reality and cinematic expediency to create the spectacular but difficult zero-gravity water sequence in *Passengers*. By Tom McLean.**

It's a given that a movie set in outer space will require visual effects, but the nature of the story on *Passengers* required especially subtle and realistic effects work by London-based MPC to support the epic tale.

Beginning life as a script written in 2007 by Jon Spaihts that made the famous "black list" of best unproduced screenplays, *Passengers* went through multiple attempts at production before landing at Sony/Columbia with Morten Tyldum (*The Imitation Game*) attached to direct and Chris Pratt and Jennifer Lawrence cast in the lead roles.

The movie is set on a huge spaceship ferrying 5,000 sleeping people on a 120-year journey to a nearby inhabited planet. When a malfunction awakens Jim (Pratt) 90 years early, he wakes writer Aurora (Lawrence) for company, and the two have to deal with increasingly dangerous malfunctions that threaten the ship and its mission.

It was producer Neal Moritz who tapped for *Passengers* Erik Nordby as visual effects supervisor and Greg Baxter as co-producer based on their experience working together on *Goosebumps*.

The first look at the script showed Nordby that some big VFX challenges were in store.

"On the first breakdown, the majority of the focus was on all the exterior space stuff in the

third act," he says. "But, interestingly, the more you sunk into it, it became clear there were some key moments in the movie that were going to require thinking outside the box."

## Water Trap

The most unusual sequence was one in which Aurora is swimming in a pool when the gravity goes out, trapping her inside the water. "She tries to escape, but the physics of that event and the surface tension of the water and the rest of it make that impossible," says Nordby. "So it's this very terrifying but cold and beautiful terror that we are trying to convey."

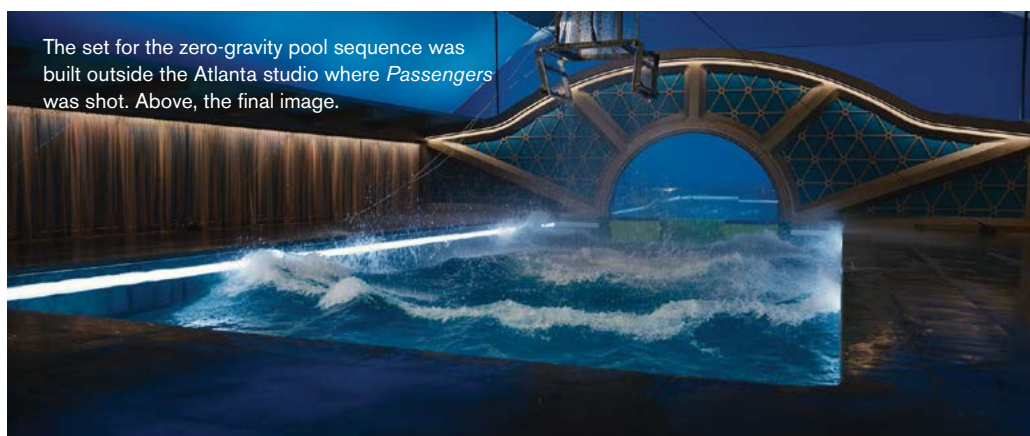
The sequence was the first extensively planned, with production design, previz, stunts

and visual effects all weighing in to develop "a united front of preparation" for the sequence Tyldum wanted.

Nordby says a suitable location couldn't be found, so the pool set was built in the gravel parking lot in front of the Atlanta stages where the production was based, with greenscreen everywhere it was needed.

"We shot days worth of elements of her, Jen, and her stunt double (Renaee Money-maker), being held underwater and going through all the necessary actions," Nordby says.

The shooting was particularly tough, with Lawrence being held under water with wires for each take. "It was very difficult to pull off; she's a true pro," says Nordby. A digital version



The set for the zero-gravity pool sequence was built outside the Atlanta studio where *Passengers* was shot. Above, the final image.



At left, photography of Chris Pratt shot on a greenscreen stage was put onto a digital version of the space suit for the final scene. Above, an example of set extension used to give the cafeteria the sense of scale needed to make audiences believe it large enough to accommodate 5,000 people. Below, another example of using digital set extensions to make the ship seem larger than the actual set it was shot on.

of Lawrence was created as a backup, but it was used in only two shots in the finished movie.

In researching how to create the water with CG, Nordby says there was a lot of very good reference shot aboard the International Space Station they could use to see how water behaves in zero gravity. "What we found is what we thought was 100 percent real ... but it looks like one big gelatinous piece of Jell-O," says Nordby.

That meant the effects team at MPC needed to add elements that made the water feel more real to the audience.

"What we had to find was a real delicate balance between what was 'real' and then introduce other real-world aspects to the water sim, such as microsplashes, what felt like slow

motion water ... as well as a lot of aerated bubbles inside the large masses of water," Nordby says. "We just checked off as many things as we could think of (about water) on our list of real-world things that people can latch on to with their eyeballs, so they would have some level of forgiveness, and focus on her and not on the simulation."

Additionally, the water had to avoid looking like it was in any way alive, or being directed to menace Lawrence's character.

"The water needs to feel benign," says Nordby. "It needs to feel completely locked into the physics of reality and could never feel like 'a water monster.' ... We knew that up front, but I can't stress how difficult that was to pull off."

The entire zero-gravity pool sequence proved the most complex, being the first major

sequence tackled in post and the final one finished for the movie, says Baxter.

### One Big Ship

Beyond the pool sequence, creating a ship that could convincingly carry 5,000 people to another planet required set extensions to convey its size and scope.

"The ship is supposed to be so vast in different areas, the warrant was to figure out what scenes, what sets, what locations could be done mostly in camera without making the ship seem small, and which ones were going to be huge to the point where maybe you shoot some closeups in camera but the rest is going to be extensions," says Baxter.

Aiding this was the clean look created by production designer Guy Hendrix Dyas that made planning and executing the extensions much easier.

Additional effects highlights included creating a red giant star and a long sequence in which Jim and Aurora have to wear large spacesuits and work outside the ship to repair it.

Baxter says the suits they developed were very heavy and that, combined with the wire work, made it very difficult for the actors to work in.

Eventually, a hybrid approach was used in which the actors' faces were put on CG space suits to get the final look. ▬

