

Astronaut trials innovative SkinSuit in space

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European Space Agency astronaut Andreas Mogensen wearing the SkinSuit on board the International Space Station. Credit: European Space Agency.

An innovative SkinSuit designed to reduce the debilitating physical effects of space flight has been trialled for the first time on the International Space Station (ISS) by a European Space Agency astronaut.

The SkinSuit is the brainchild of Dr James Waldie, aerospace engineer and senior research associate at RMIT University in Melbourne, Australia.

Denmark's first astronaut, Andreas Mogensen, spent 10 days in the ISS last month and pulled on the SkinSuit to test its effectiveness in the weightless conditions.

Inspired by a striking bodysuit worn by Australian gold medallist Cathy Freeman at the 2000 Sydney Olympics, Waldie and his collaborators have spent more than 15 years getting the suit into space.

"Seeing live video of Andreas wearing SkinSuit on board the ISS was thrilling - I felt an enormous sense of achievement that my concept was finally in orbit," Waldie said.

Skin-tight and made of bi-directional elastics, SkinSuit has been designed to mimic the impact of gravity on the body to reduce the debilitating physical effects space flights have on astronauts' bodies.

In the weightless conditions in space, astronauts can lose up to 2 per cent bone mass per month. Their spines can also stretch by up to 7cms, with most suffering mild to debilitating pain. Following flight, astronauts have four times the risk of herniated discs as the general population.

"Given the impact of atrophy on astronauts in space, I wondered if a suit like the one worn by Freeman could fool the body into thinking it was on the ground rather than in space, and therefore stay healthy," Waldie said.

The special design of the suit means it can impose a gradual increase in vertical load from the wearer's shoulders to their feet, simulating the loading regime normally imposed by bodyweight standing on earth.

For the ISS flight, the European Space Agency wanted to explore if the suit could counteract the effects of spaceflight on the spine.

"We believe if we can reduce spinal elongation in space, we can reduce the stress on the intervertebral discs. This should help with pain in-flight, and the chances of slipped discs post-flight."

The suit underwent rigorous ground and parabolic flight trials before being selected for the ISS mission and also had to pass a spaceflight qualification programme.

As the inventor and a Principal Investigator, Waldie flew to the European Astronaut Centre in Cologne, Germany, for the first on-orbit trial and said he was elated to see SkinSuit had finally been tested in space.

"It was really exciting but also very humbling, as there are so many people that have dedicated so much effort to this success. To share their passion, and see it all come to fruition, has been amazing."

SkinSuit has been developed in collaboration with scientists from the Massachusetts Institute of Technology, Kings College London and the European Space Agency. The suit was manufactured by Italian firm Dainese, best known for producing motorbike leathers for racing.

Enjoying his first [space flight](#), European Space Agency astronaut Mogensen tested SkinSuit over two days as part of an Operational and Technical Evaluation.

He took frequent height measurements, comfort and mobility surveys, skin swabs for hygiene assessments, and also exercised with the [suit](#) on the Station's bicycle ergometer.

Mogensen has since returned to Earth but is yet to publicly report his findings as he undergoes extensive de-briefing.

Provided by RMIT University

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