

NASA STEM CELL RESEARCH PROJECT

BioServe Space Technologies **Leverages** Advanced FFF 3D Printing

Solution powered by

3DGENCE



INDUSTRY
RESEARCH INSTITUTE

APPLICATION
TOOLS & FIXTURES

LOCATION
USA

MATERIALS
ULTEM™ 9085

CUSTOMER PROFILE



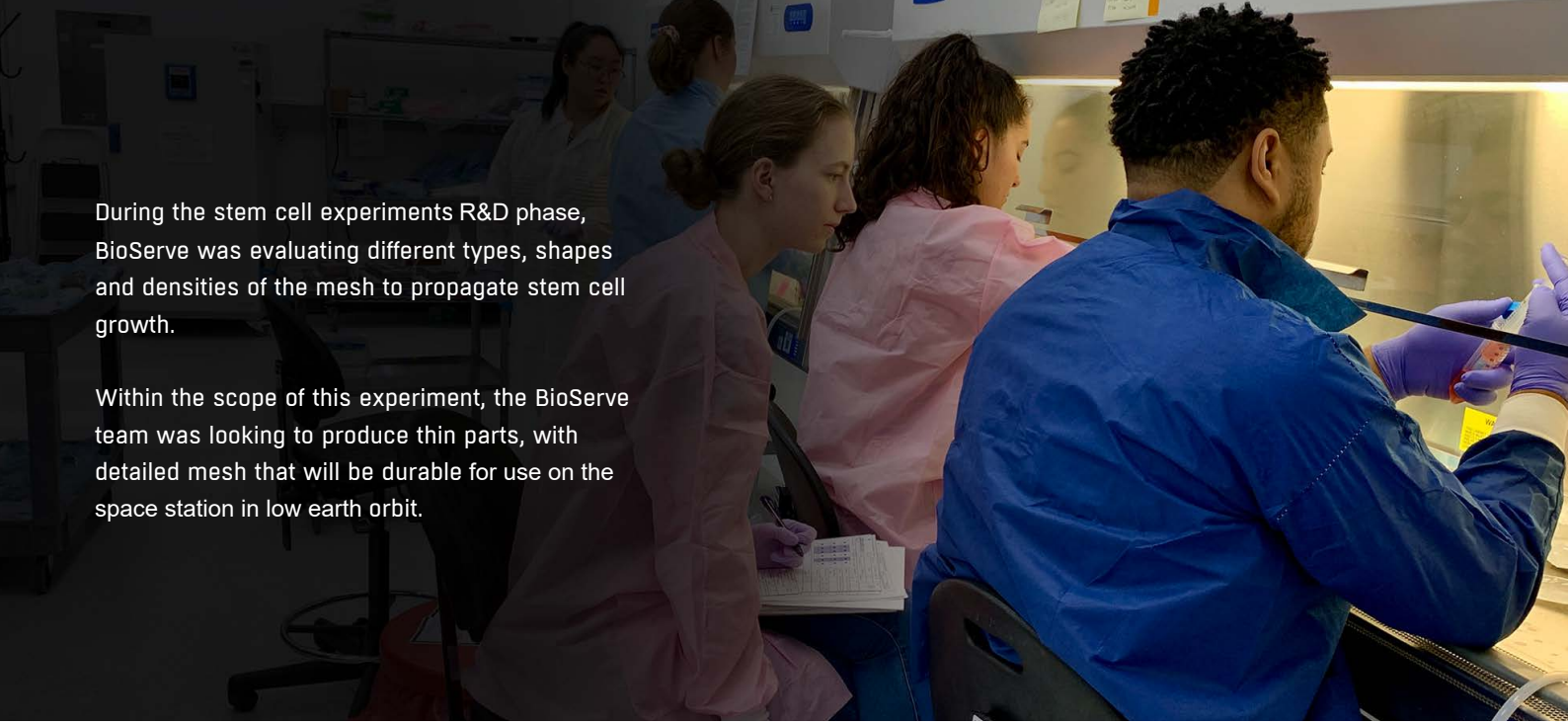


BioServe Space Technologies is a Center within the Ann and HJ Smead Aerospace Engineering Sciences department at the University of Colorado Boulder.

Since its inception in 1987, BioServe has designed, built, and flown hundreds of microgravity life science research experiments and hardware on over 85 spaceflight missions.

BioServe has a full suite of spaceflight-certified hardware available for use by its customers and partners. Past partners include **pharmaceutical** and **biotechnology companies**, **Universities, NIH, NASA-funded** and **other government agency researchers.**

BioServe is a full-service, turn-key organization that enables its customers and partners to focus solely on research while BioServe manages all other activities required to successfully fly experiments in microgravity.



During the stem cell experiments R&D phase, BioServe was evaluating different types, shapes and densities of the mesh to propagate stem cell growth.

Within the scope of this experiment, the BioServe team was looking to produce thin parts, with detailed mesh that will be durable for use on the space station in low earth orbit.

THE CHALLENGE

CHEMICAL RESISTANCE

IMPACT STRENGTH

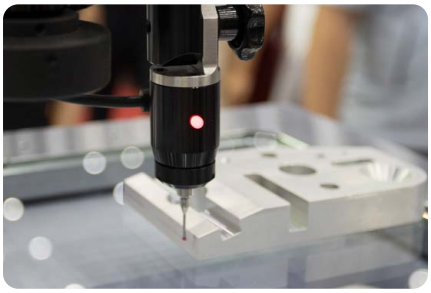
DIMENSIONAL ACCURACY

LIMITED MATERIALS AVAILABILITY

PROJECT EVOLUTION







INITIAL PROTOTYPES

Produced on desktop 3D printers, though unsuitable for engineering-grade polymers due to temperature and chemical resistance limitations.

MATERIAL SELECTION

ULTEM™ 9085 was chosen for its chemical resistance*.

* Currently the only FAA certified material for Aerospace, capable of withstanding exposure to a wide range of chemicals and high-temperature.

TECHNICAL TRANSITION TO AN INDUSTRIAL 3D PRINTER

Due to the shape of the model and level of details required for the mesh, CNC machining from ULTEM™ was not possible.

The high-quality parts really make this product possible. It will be very hard to have machined or fabricated the high-quality stem cells otherwise.
During my initial research, I called around and clicked on many 3D printing technologies before finding your company. It was great to be able to talk about the application and get what we needed.
Everyone else just wants to hit print and send the part. Exceptional service and quality!

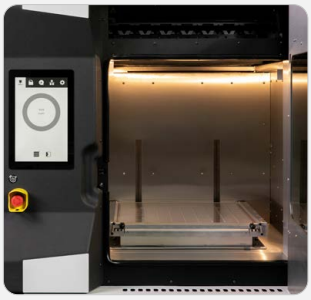
Paul Koenig
***BioServe** Senior Mechanical Engineer*

TECHNICAL SOLUTION



THE OPTIMUM SOLUTION WAS FOUND BY WORKING WITH THE ENGINEERS AT 3DGENCE.

With its actively heated chamber up to 195°C, the 3DGence INDUSTRY™ F421 3D printer can process wide range of materials including ULTEM™ 9085 material, and the system was selected for the rapid production of the batches of stem cell meshes. The critical dimensions of the parts were validated to have <0.1% deviation.



POWERFUL HEATED CHAMBER

Optimum conditions for industrial 3D printing with heated chamber up to 195°C



HIGH-PERFORMANCE MATERIALS

Enables the processing of high-performance polymers like CF-PEEK, PEEK, PEKK or ULTEM



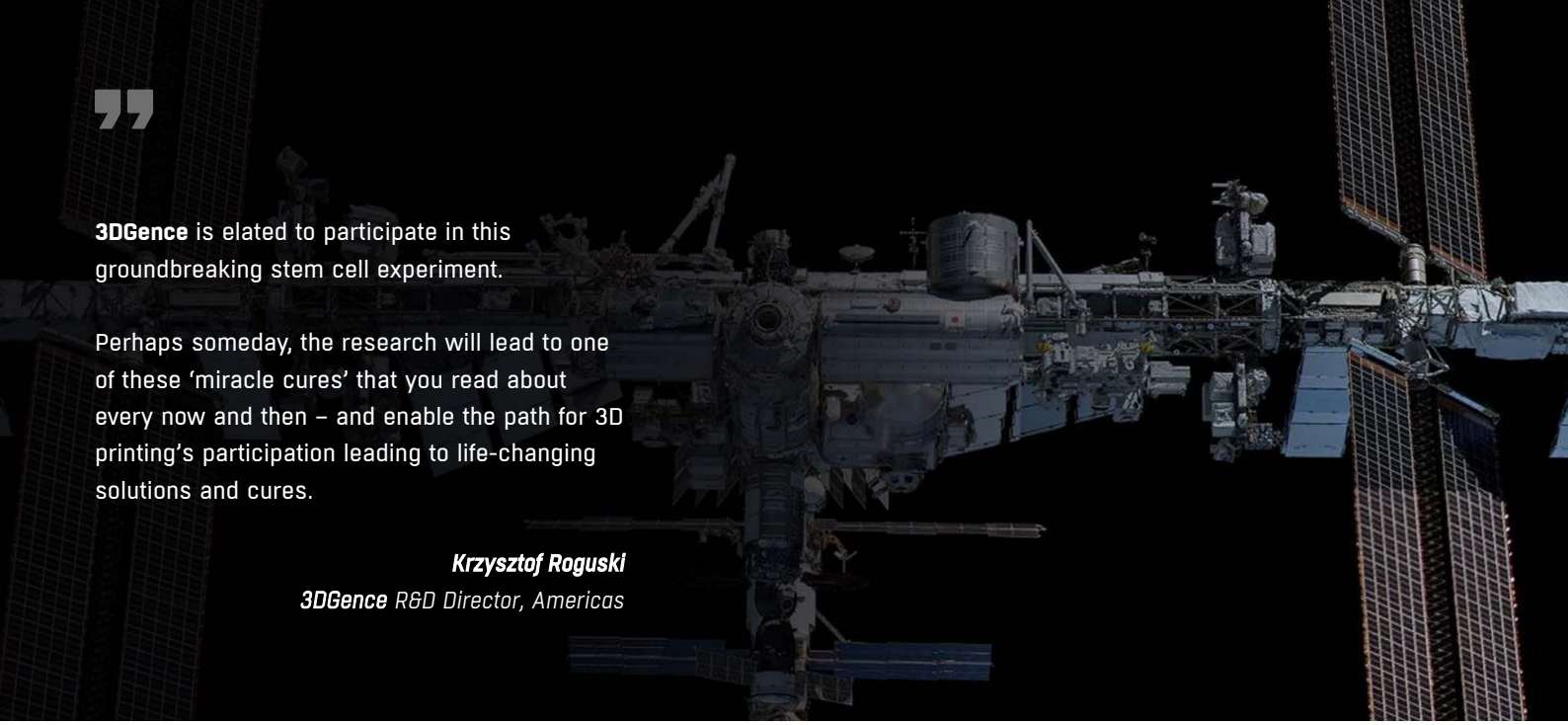
DIMENSIONAL ACCURACY

Measured at <0.1% compared to model



HIGH PRINT SPEED

Job-specific print modules and developed print profiles with print speeds of up to 400mm/sec

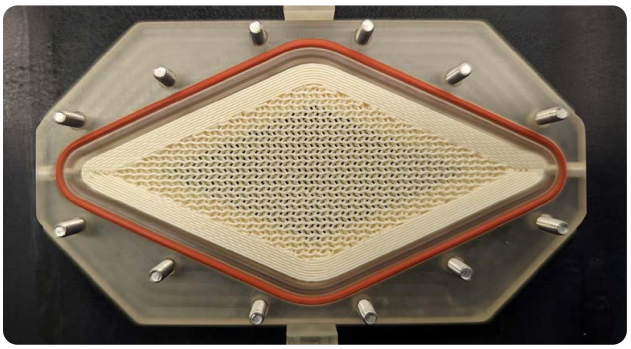


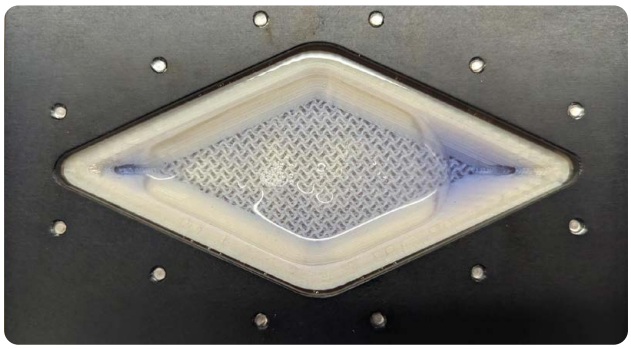
3DGence is elated to participate in this groundbreaking stem cell experiment.

Perhaps someday, the research will lead to one of these 'miracle cures' that you read about every now and then – and enable the path for 3D printing's participation leading to life-changing solutions and cures.

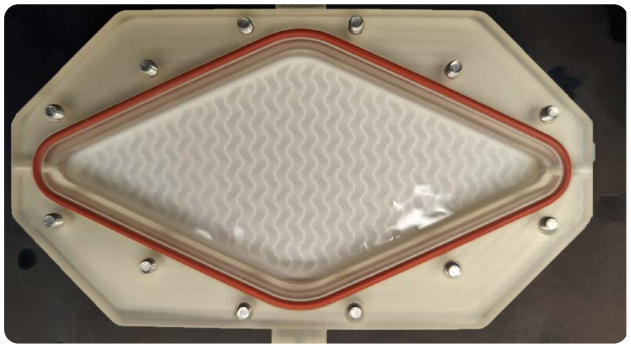
Krzysztof Roguski
3DGence *R&D Director, Americas*

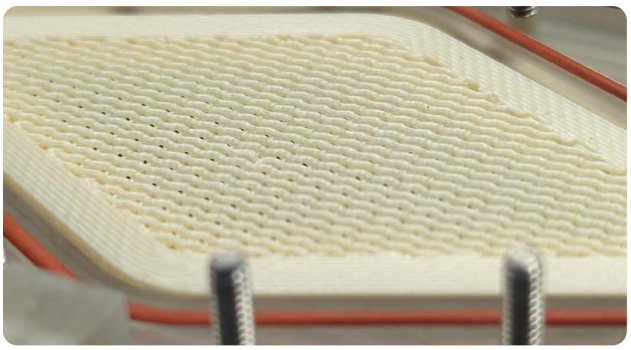
FROM DESIGN VALIDATION TO FINAL PART

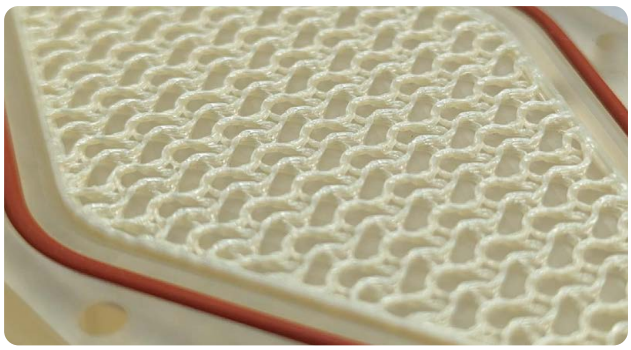












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First Automated Material Management System for optimal print results

Open Material Base with Engineered Ready-to-Use Print Profiles

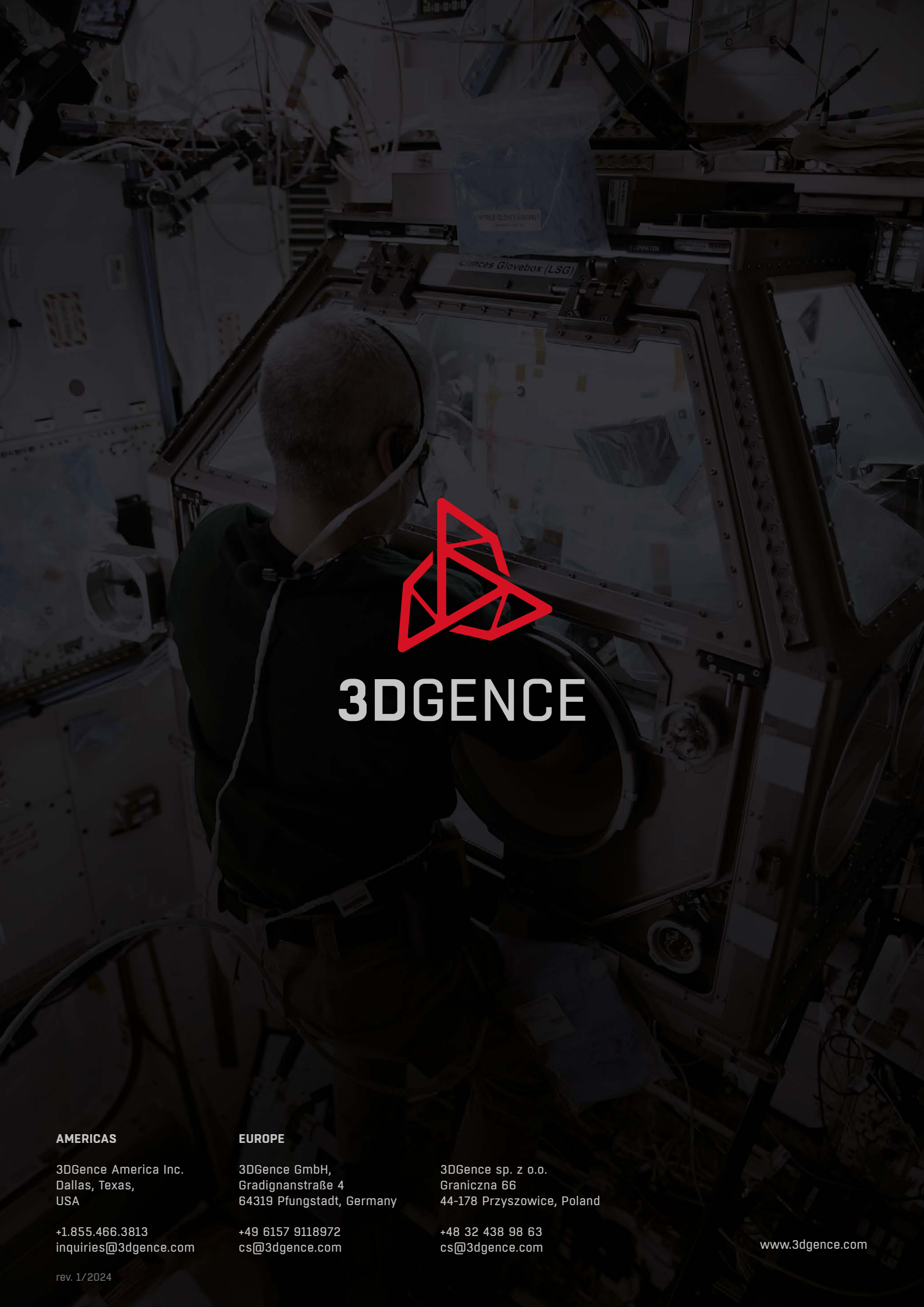
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