

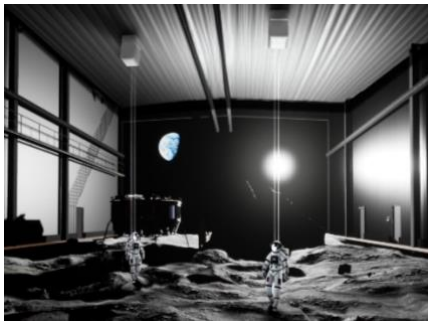
Mobile Gravity Off-loading System (MOGOS)

Scalable Multi-Agent Gravity Off-loading Solution



Overview

Space Applications Services developed a novel Mobile Gravity Off-loading System providing gravity off-loading to multiple persons, rovers and equipment allowing each to freely move and interact without the usual constraints of crane-based solutions. The system allows physically close interactions and can accurately follow the natural movements of a person hanging below the vehicle.



Mobile Gravity Off-loading System

System Features

The system comprises of a **ceiling structure** with T-profiles integrated with multiple **CeiliX vehicles**, each equipped with a **gravity off-loading unit**.

Each mobile unit operates independently across the ceiling frame, featuring omnidirectional mobility to maximize the range of motion for individual payloads. The vehicles accurately track and respond to the natural movements of the persons/payloads beneath them.

The gravity off-loading unit employs an adjustable semi-passive mechanism based on a constant-force energy storage principle. This guarantees a high level of safety while providing a force output ranging from 0.1g to 1g. The system is engineered to be devoid of

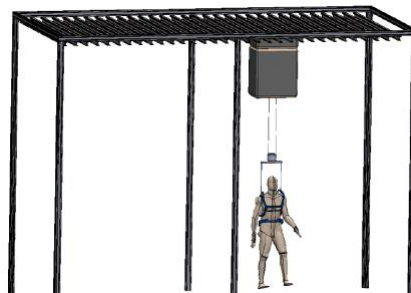
inherent inertia, a crucial benefit that supports dynamic movements.

A suspension cable ensures a secure connection between the off-loaded payload and its corresponding mechanism.

System Options

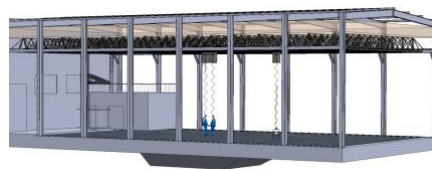
The Mobile Gravity Off-loading System is available in two configurations:

Self-Standing Frame: This option can be installed in various indoor environments, providing flexibility in placement.



Self-Standing Frame

Building Retro-fitted Structure: The system ceiling structure is securely mounted on the building's existing structure. This solution allows much larger work surfaces, making it suitable for larger operational areas. The ceiling structure is adaptable and scalable to any building geometry.



Building Retro-fitted Structure

The Mobile Gravity Off-loading System is offered as Commercial-Off-The-Shelf (COTS) product with customization options available to meet specific requests.

APPLICATIONS

- Astronaut EVA training
- Micro-gravity system technology testing
- Payload deployment and tests under gravity off-loading
- Overhead assembly of large structures
- Health rehabilitation centres

SERVICES AVAILABLE

- Installation on site
- System commissioning
- Operators training
- Maintenance

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ABOUT SPACE APPLICATIONS SERVICES

Space Applications Services NV/SA is an independent Belgian company founded in 1987. Aerospace Applications North America is our Partner company in Houston, USA.

Our aim is to research and develop innovative systems, solutions and products and provide services to the aerospace and security markets and related industries. Our activities cover manned and unmanned spacecraft, launch/re-entry vehicles, control centres, robotics and a wide range of information systems.



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Mobile Gravity Off-loading System Specifications

Ceiling Frame		
Ceiling Type	Self-Standing	Building Retro-fitted
Dimensions	Up to 40 m2 Up to 430 sq ft	No limitations
Mass	20 - 75 kg/m2 4 – 15.4 psf	35 kg/m2 7.2 psf
Rails with integrated power bus	240V AC 50Hz 120V AC 60Hz	3 x 400V AC 50Hz 3 x 480V AC 60Hz

CeiliX Vehicles				
Vehicle Type	Small	Medium	Large	Extra- Large
Dimensions	70x40x21.5 cm 28x16x8 in	70x50x21.5 cm 28x20x8 in	90x60x30 cm 35x24x12 in	110x60x30 cm 43x24x12 in
Mass	50 kg 110 lbs	100 kg 220 lbs	150 kg 330 lbs	180 kg 397 lbs
Load capacity	400 Kg 882 lbs	800 Kg 1766 lbs	1200 Kg 2645 lbs	1600 kg 3527 lbs
Velocity (single axis)	3 m/s 9.8 ft/s		1 m/s * 3.3 ft/s	
Peak Power	2 kW	3kW	10kW	10kW
Human Rated	Yes	Yes	No	No

* According to EU laws for crane operations above 1.2T load capacity

Gravity Off-loading Unit (Constant Force Module – CFM)		
Dimensions	95 x 65 x 60 cm 37 x 26 x 24 in	
Mass	120 kg 265 lbs	
Off-loading Capacity	20 – 300 kg 44 – 660 lbs	Applicable to 0.1g to 1.0g
Max stroke	1,2 m @300kg, 2,4 m @ 150kg 3.9 ft @660 lbs, 7.8 ft @330 lbs	Work range of passive CFM, configurable

Optional Modules		
• Active Winch		
Mass	60 kg 132 lbs	To be added to the CFM mass
Load/Off-loading capacity	up to 300 kg up to 660 lbs	No high dynamics motion
• Motion Control		
Positioning Sensors	Local odometry, Global ultrasonic ranging	
Connectivity	5GHz mesh network	

Ceiling Frame with M-size CeiliX Vehicle



Ceiling Frame with S-size CeiliX Vehicle



Gravity Off-loading Unit



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