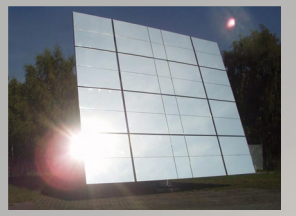
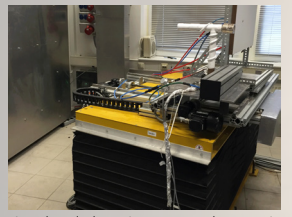
Building elements for constructions on the Moon shall be derived from design parameters presented by both large and small scale perspectives. Starting from the properties of lunar regolith and its sintered product, FEM and structural analysis inform the design of a building element which takes into account the mission scenario.

Image credit: LIQUIFER Systems Group, rendering by René Waclavicek, background image (Earth) courtesy of NASA.

# REGOLIGHT



In the test facilities at DLR, solar rays are collected from the natural outdoor environment, using a mosiac of mirrored surfaces to concentrate solar energy into a single beam. Photo credit: DLR



Since the solar beam is concentrated at a certain point in space, the material to be shaped must move around the solar beam. A moveable table, capable of moving in x,y,z, axis (an x,y,z translation table) will be designed similar to the picture above. Photo credit: DLR

Regolith simulant will be fully characterized to optimize the additive manufacturing process of a building element with a fine structure.
RegoLight is using lunar soil simulant class JSC-2A
Top photo credit: Arnold Reinhold CC BY-SA 3.0
Bottom photo credit: DLR

**Technology Readiness Level**

Solar sintering of regolith is currently at Technology Readiness Level 3 (TRL3) with 'experimental proof of concept.'

**RegoLight OBJECTIVE**

RegoLight aims at enhancing this specific Additive Layer Manufacturing (ALM) technique, advancing the current Technology Readiness Level to 5 (TRL5), requiring the 'verification of the critical function of a component and/or breadboard in a relevant environment.'

RegoLight develops a regolith solar sintering device breadboard which will be validated in a thermal vacuum, similar to the lunar environment.

The printed components will undergo mechanical properties tests to build a database and FEM analysis for validation of the concepts.

RegoLight considers three different possible ways in which to develop the new breadboard including, an improved method of moving the sand bed, the mobilization of the print head - capable of both pointing a concentrated solar beam and deploying incrementally additional layers of regolith, or through the concentration of the solar beam into a fibre optic.

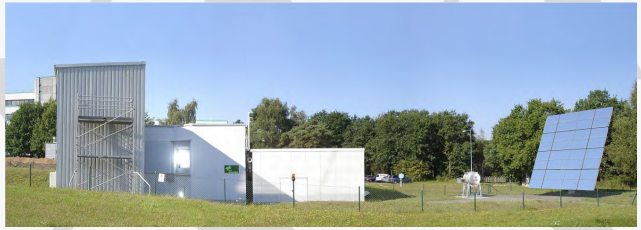
**RegoLight - Sintering Regolith with Solar Light**

RegoLight advances existing 3D-printing technologies and methodologies for the purpose of sintering and shaping lunar regolith, a readily available resource on the Moon's surface comprised of a loose layer of dust, soil and broken rocks.

Utilizing the sun to solar sinter regolith, habitable structures can be built which will pave the way for a permanent outpost on the Moon.

The RegoLight team will develop a novel printer that can produce a modular building element made of a regolith simulant, through solar sintering in a vacuum chamber. Validating these printing technologies will reduce the required payload necessary to create architectures off Earth and the overall cost of future missions.

The project builds on the successful demonstration of core concepts from previous ESA studies and leverages the expertise and resources of the consortium members. RegoLight is strategically aligned with the International Space Exploration Coordination Group (ISECG) General Exploration Roadmap that of which has interest in advancing the capabilities needed for future exploration missions.




DLR – German Aerospace Centre

**Prof. Dr. Matthias Sperl**
Experiments in Granular Materials
Institute of Materials Physics in Space
Linder Höhe
51147 Cologne, Germany
matthias.sperl@dlr.de

Space Applications Services

**Diego Urbina**
Future Projects and Exploration Team
Leuvensesteenweg 325
1932 Zaventem, Belgium
diego.urbina@
spaceapplications.com

LIQUIFER Systems Group

**Dr. Barbara Imhof**
Obere Donaustrasse 97-99/1/62
1020 Vienna, Austria
barbara.imhof@liquifer.com

COMEX

**Dr. Peter Weiss**
Space and Innovations Division
Boulevard des Oceans 36
13009 Marseille, France
p.weiss@comex.fr

Bollinger Grohmann Schneider

**Arne Hofmann**
Franz-Josefs-Kai 31/1/4
1010 Vienna, Austria
regolight@
bollinger-grohmann-schneider.at


www.regolight.eu


RegoLight is a 2-year project under the European Union's Horizon 2020 Programme, within the topic of COMPET-03-2015. The project started November 2015 and will conclude November 2017.


# REGOLIGHT

Sintering Regolith with Solar Light