National Aeronautics and Space Administration

On-orbit Servicing Assembly and Manufacturing (OSAM)

Technology Transfer Workshop

Journeying Longer and Seeing Farther

Sept 22-23, 2020

Advanced Materials and Feedstock Development for On-orbit Manufacturing

Dr. Jennifer Edmunson - NASA/MSFC

Dr. Tracie Prater – NASA/MSFC

The In-Space Manufacturing and Moon to Mars Planetary Autonomous Construction Technology Teams

The Current Paradigm - Revisited

Each square represents 1000 kg

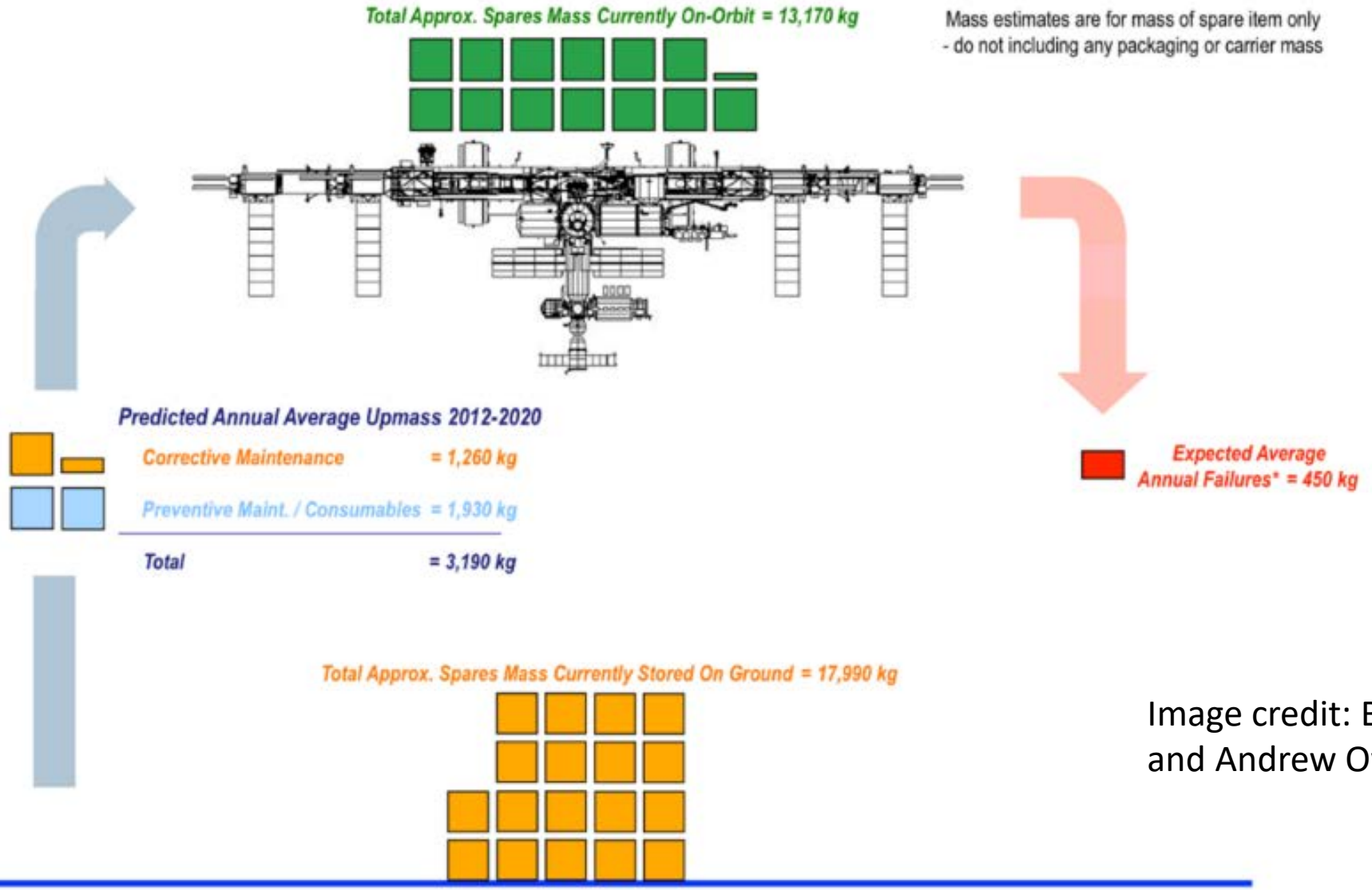
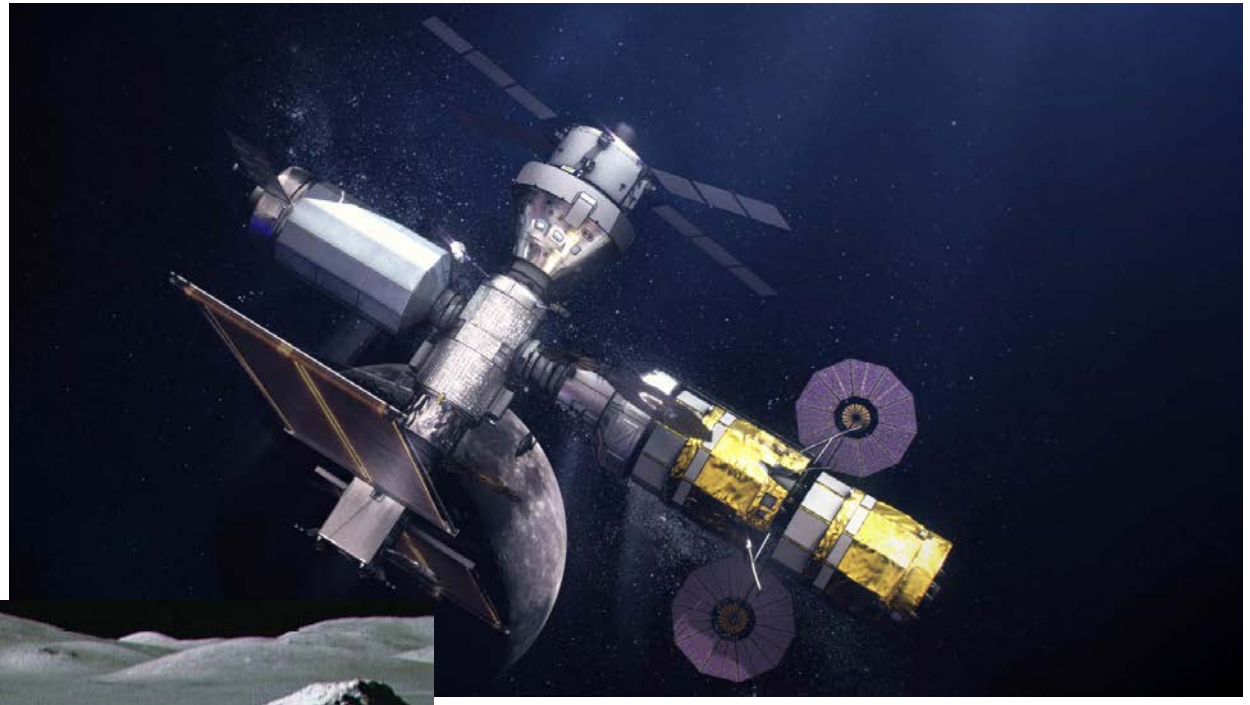


Image credit: Bill Cirillo (LaRC) and Andrew Owens (MIT)

The New Paradigm - Envisioned

Image credit: NASA

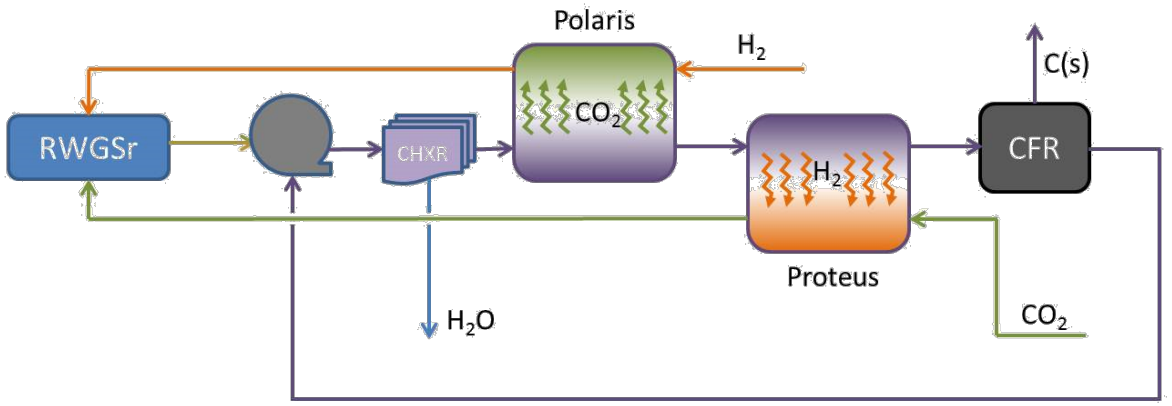


Gateway graphic credit: NASA

Apollo 17 astronaut
Harrison “Jack” Schmitt
(credit: NASA/Gene Cernan)

Recyclables

Series-Bosch approach for oxygen recovery from CO_2 (credit: NASA/Morgan Abney)

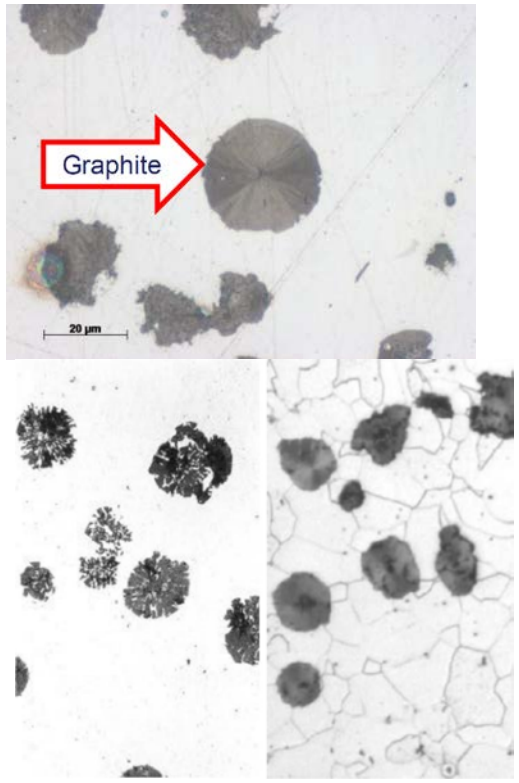


Thermally reversible polymer products (image courtesy of Cornerstone Research Group)

ISS crewmember Mike Fossum holding a “trash football” (credit: NASA)

ISS crewmember Sandra Magnus holding food bags (credit: NASA)

Metals



Images from Mississippi State University/Blake Stewart (MSFC CAN)

Image from Made In Space, Inc. (MSFC SBIR)

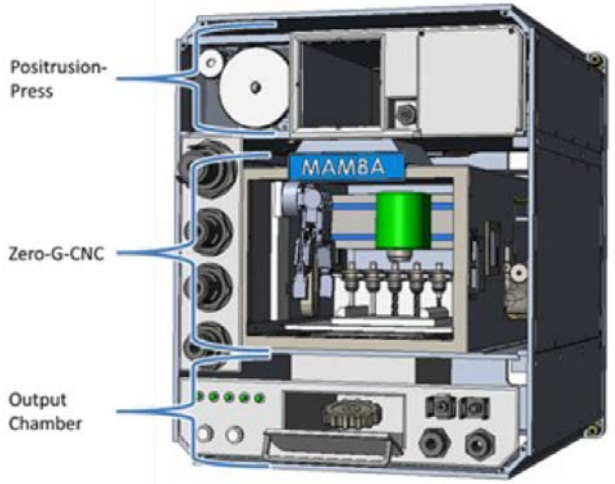


Image from Tethers Unlimited, Inc. (MSFC SBIR)

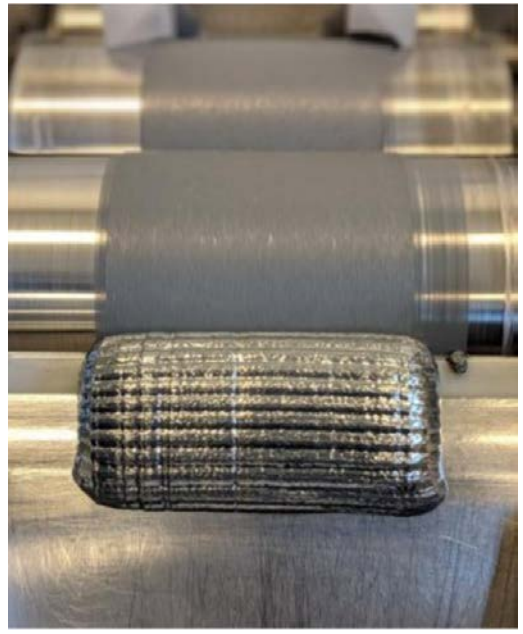
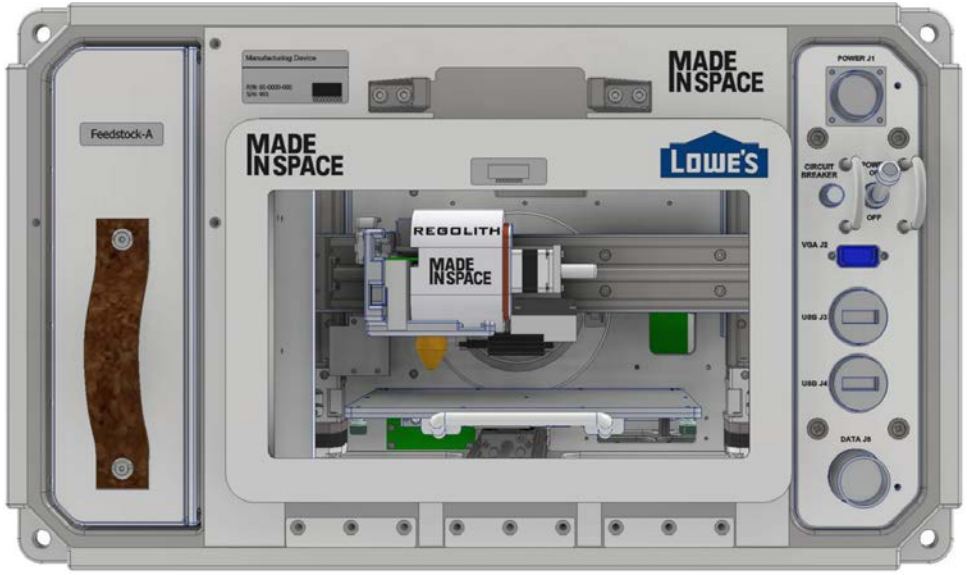


Image from Curtis Hill/ ESSCA/NASA MSFC

Image from Techshot, Inc. (MSFC SBIR)

Regolith-Bearing Materials

Regolith International Space Station (RegISS) Technology Demonstration images from Made In Space, Inc. (MSFC IDIQ)



NASA EXPLORATION SYSTEMS AND HABITATION ACADEMIC INNOVATION CHALLENGE
HAB

Advanced Exploration Systems student challenge (2018-2019 school year)
Logo credit: NASA

Next Steps

- Develop the materials and technologies necessary to produce feedstock from non-terrestrial materials

Image from
Made In Space, Inc.

Curiosity at Glen Etive
Sol 2,553 (credit: NASA/JPL-Caltech/MSSS)

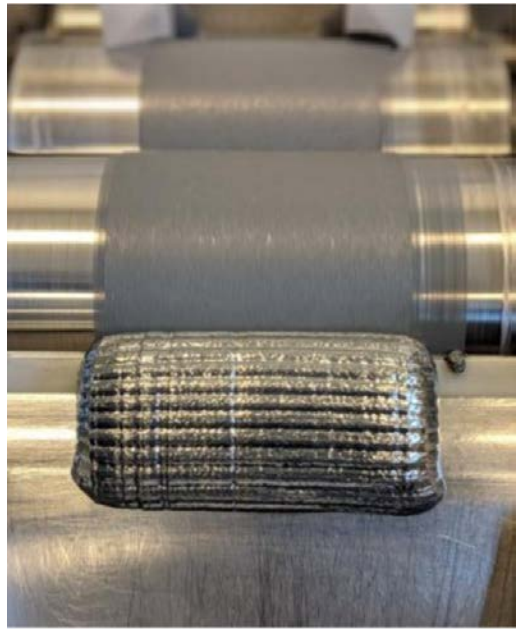


Image from Curtis Hill/
ESSCA/NASA MSFC

Next Steps

- Develop the materials and technologies necessary to produce feedstock from recyclables

ISS crewmember Sandra Magnus holding food bags (credit: NASA)

ISS crewmember Mike Fossum holding a “trash football” (credit: NASA)

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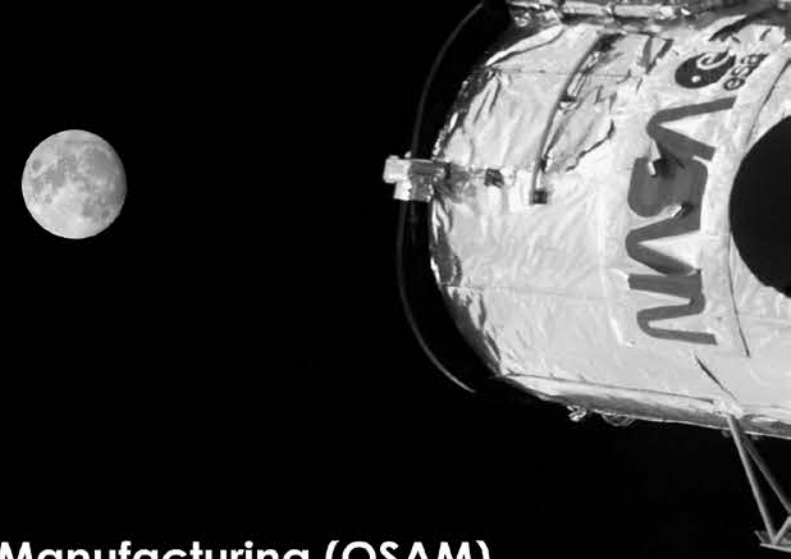

On-orbit Servicing Assembly and Manufacturing (OSAM)

Journeying Longer and Seeing Farther

Robots are poised to make what was once thought to be impossible in space a reality. From extending the lifespan of satellites, to assembling massive life-seeking telescopes in space, to refueling and repairing spacecraft on journeys to distant locations, the possibilities are endless. Key to these endeavors is demonstrating the foundational capabilities – servicing, assembly, and manufacturing.

To arrange further discussion of on-orbit servicing technologies contact Laura Hardin (256-990-1952 or laura.hardin@nasa.gov)

Background Graphic: OSAM technologies continue the legacy of the Hubble Space Telescope (HST) Servicing Missions, and will be implemented to assist astronauts span and expand orbiting stations like the International Space Station (ISS). OSAM technologies will also support lunar surface and orbiting operations.