PP cleanroom development at JAXA

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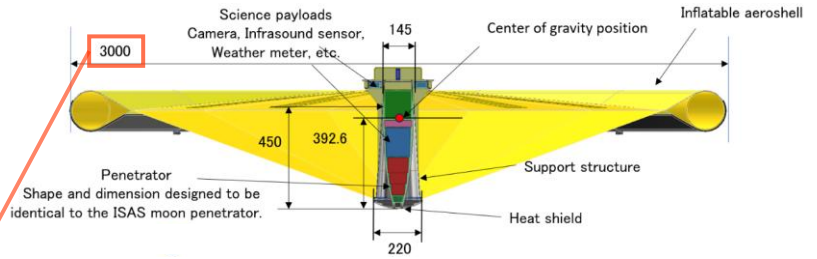
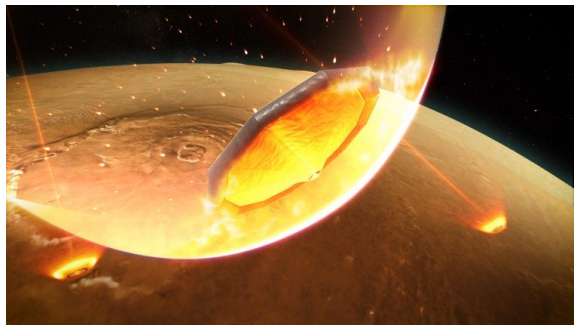
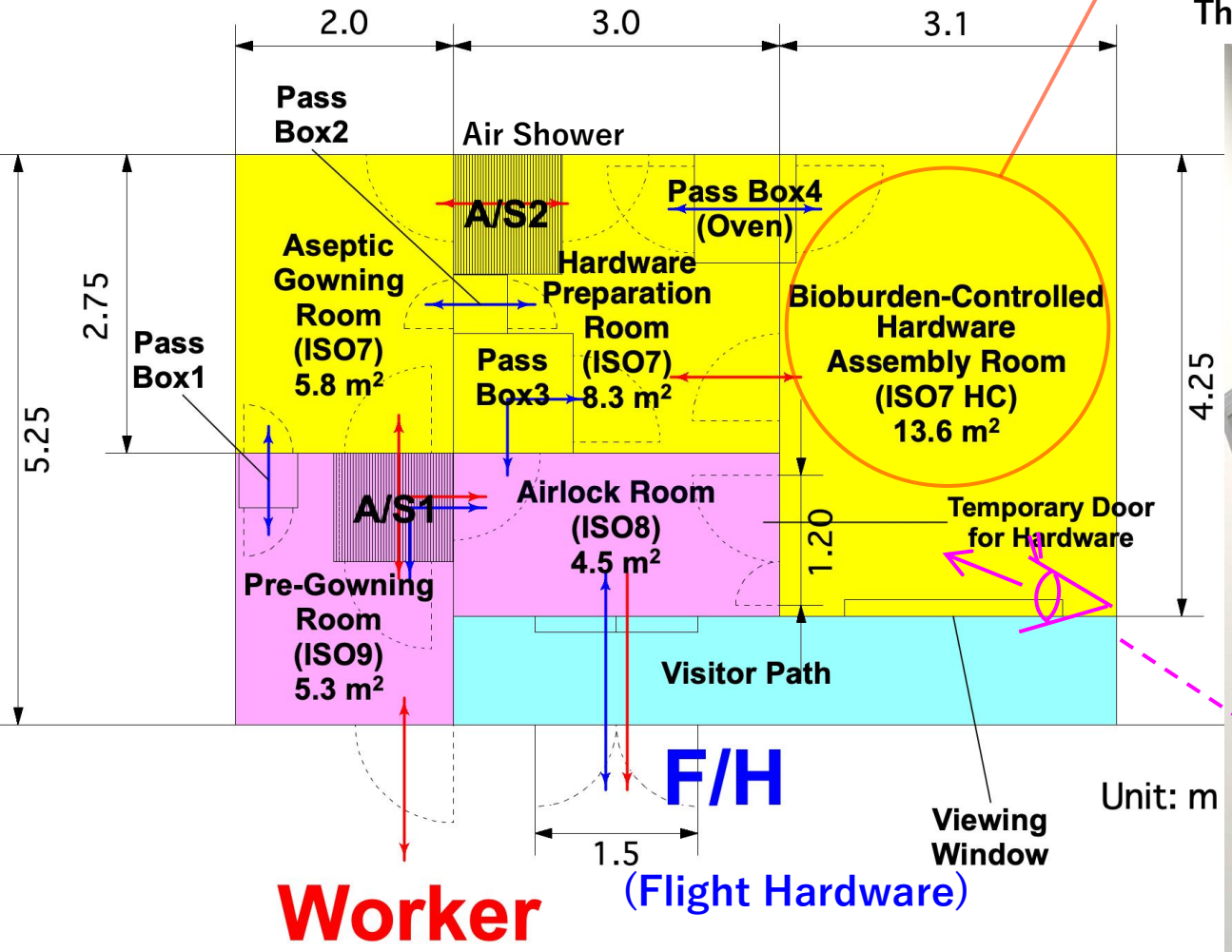
The establishment of a cleanroom for Mars landing missions.
It will be completed in 2026

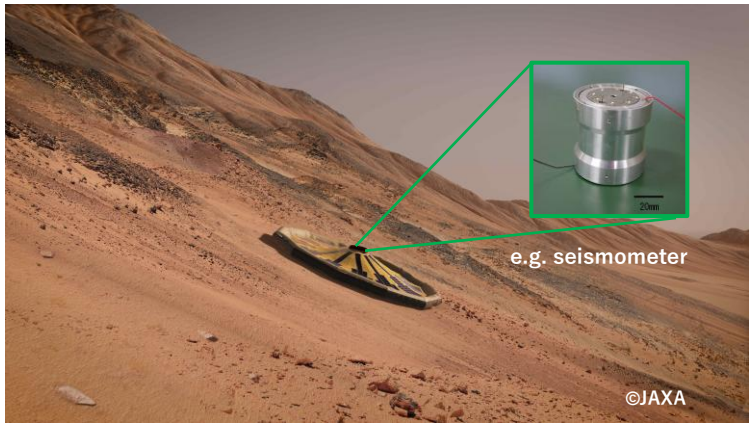


The Micro lander with Inflatable aeroshell





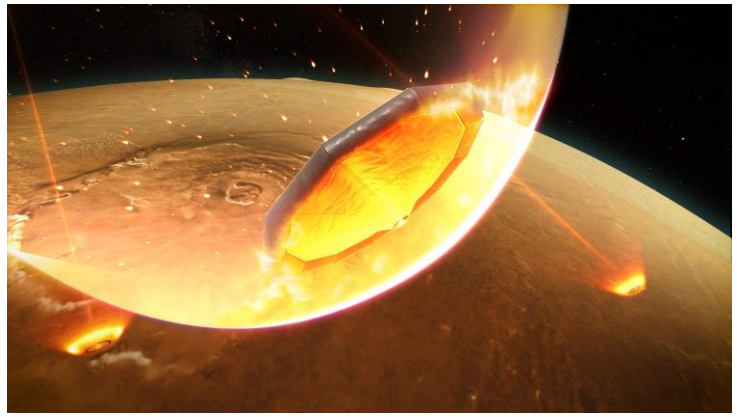
Overview of the Step 1 mission in Mars Landing Exploration Plan of Japan



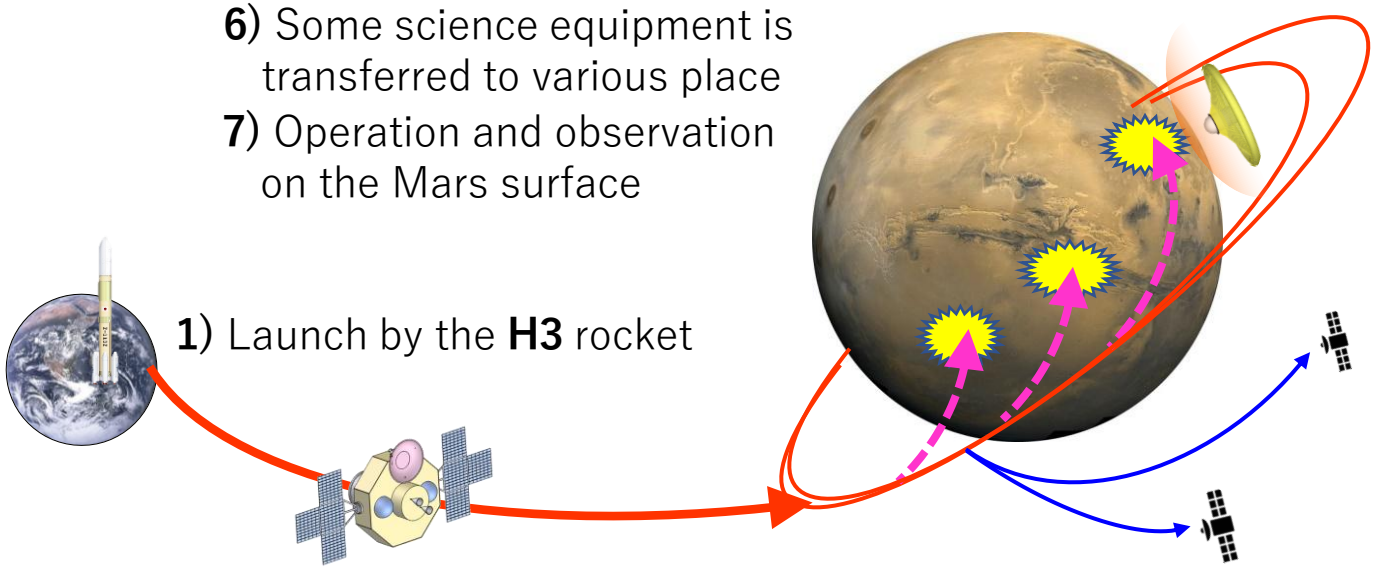
6) Some science equipment is transferred to various place

7) Operation and observation on the Mars surface

5) Demonstration of the Entry, Descent and Landing (EDL) technology in several times



Utilizing the **inflatable aeroshells** to realize the small EDL module



1) Launch by the **H3** rocket

2) Transfer to Mars by Orbit Transfer Vehicle (**OTV**)

3) Mars Orbit Insertion by OTV

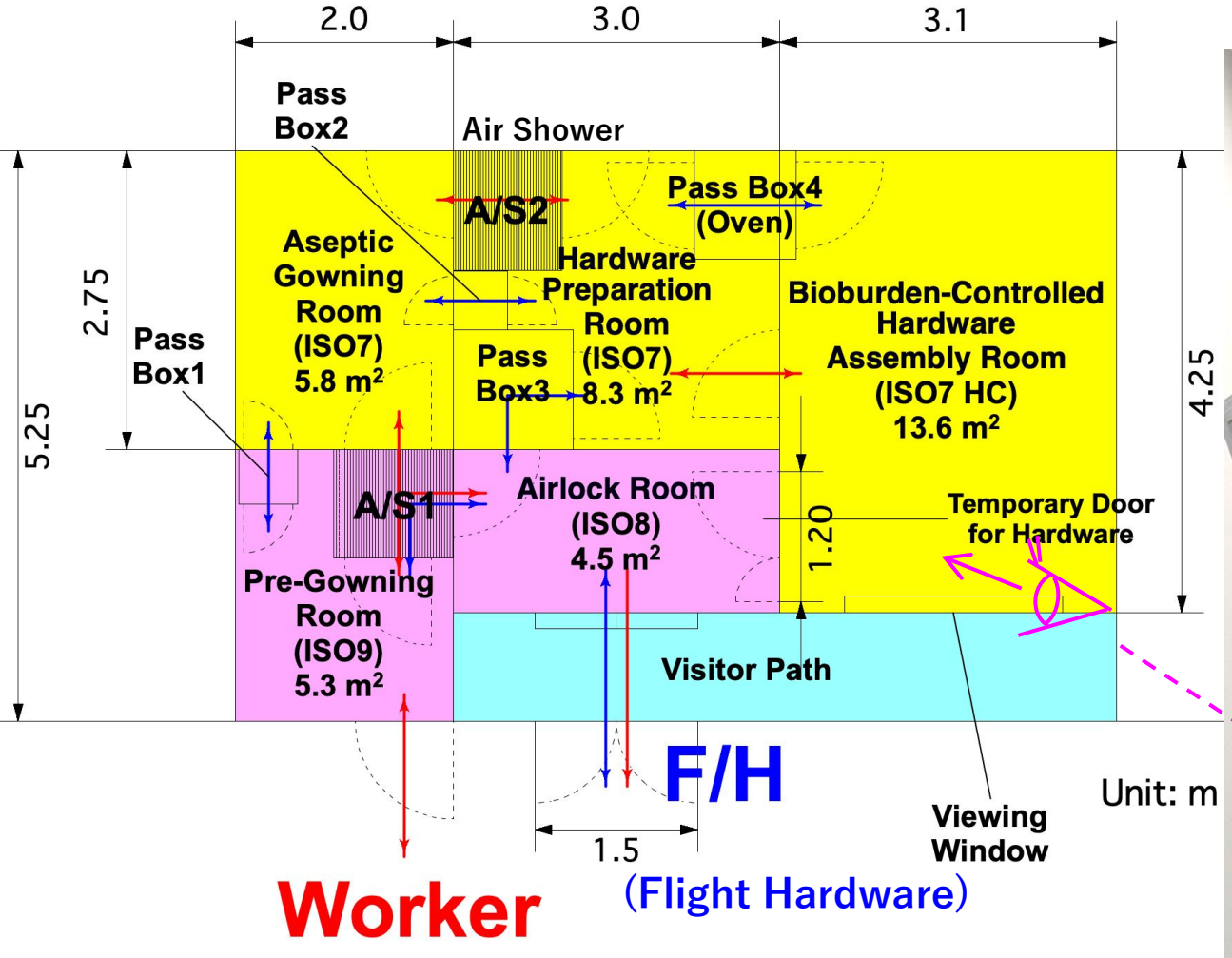
4) Deployment of multiple small landers (20~30 kg x 2~4 unit) and small satellites (MARS CUBE service) from OTV

(Modified from **Yamada et al., 2023**)

This would be the first case of Mars landing mission of Japan

Planetary Protection CleanRoom (PPCR) 1

- A cleanroom for microbial contamination control has been established at the JAXA Sagamihara Campus to support Mars landing missions (e.g., Mars landings).
- The initial target mission is a micro Mars lander; the facility and methods will also be applicable to other missions.














Pass Box2
Air Shower
A/S2
Pass Box4
(Oven)
Aseptic
Gowning
Room
(ISO7)
5.8 m²
Hardware
Preparation
Room
(ISO7)
8.3 m²
Pass
Box3
Bioburden-Controlled
Hardware
Assembly Room
(ISO7 HC)
13.6 m²
Pass Box1
A/S1
Airlock Room
(ISO8)
4.5 m²
Temporary Door
for Hardware
1.20
Pre-Gowning
Room
(ISO9)
5.3 m²
Visitor Path
F/H
Viewing Window
1.5
(Flight Hardware)
Worker


CAM1
CAM2
CAM3
CAM4


KEYENCE
TR-W1000
更衣室前室温度
21.8
機器準備室温度
22.3
更衣室前室湿度
53.2
機器準備室湿度
37.6
無菌更衣室温度
21.8
無菌更衣室湿度
52.7

Proposed Assembly Flow for a micro Mars Lander (TBD)

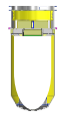
Inflatable aeroshell / Solar cell sheet

Solar cell sheet stitching

Packaging

Transfer (into cleanroom (CR))

Metal housing



Packaging

Transfer

Penetrator components

Heat-tolerant components (seismometer, communication unit, etc.)

Packaging

Transfer

Non-heat-tolerant components (avionics, battery, infrasound sensor, etc.)

Manufacturing environment control

Packaging

Transfer

PPCR airlock room or Building-C1 CR

Alcohol wipe-down

Initial Bioburden (BB) test

Dry heat microbial reduction (DHMR)

Alcohol wipe-down

Initial BB test

DHMR

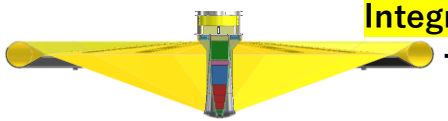
Alcohol wipe-down

BB test or estimation (likely final value)

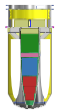
Transfer (into bioburden-controlled area)

Transfer (into bioburden-controlled area)

Integrate



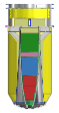
Integrate



Leak check

Bioburden test

PPCR bioburden -controlled area



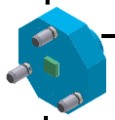
Aeroshell encapsulation

Packaging (recontamination prevention)

Alcohol wipe-down / bioburden test as needed

Transportation

OTV manufacturer CR

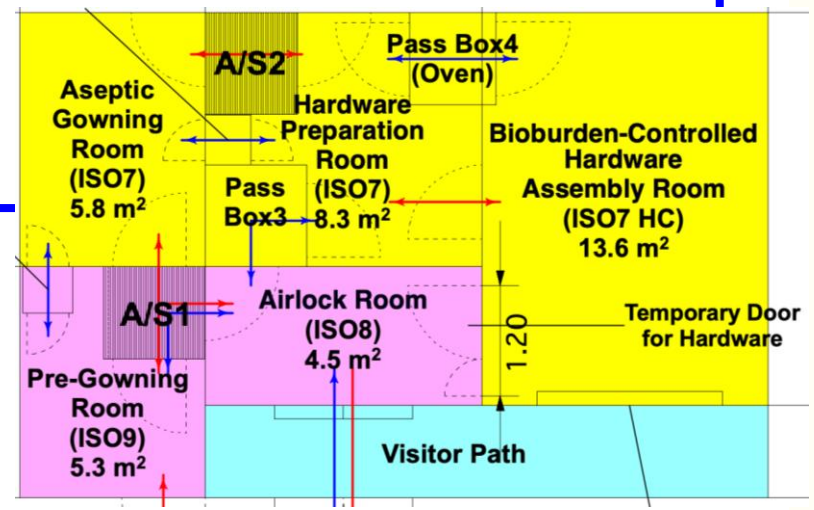


Integration with OTV (Orbital Transfer Vehicle)

Alcohol wipe-down / bioburden test as needed

JAXA/TNSC (launch site)

Processes planned to be conducted in the PPCR1



After importation to TNSC, spacecraft can be kept in clean environments until launch