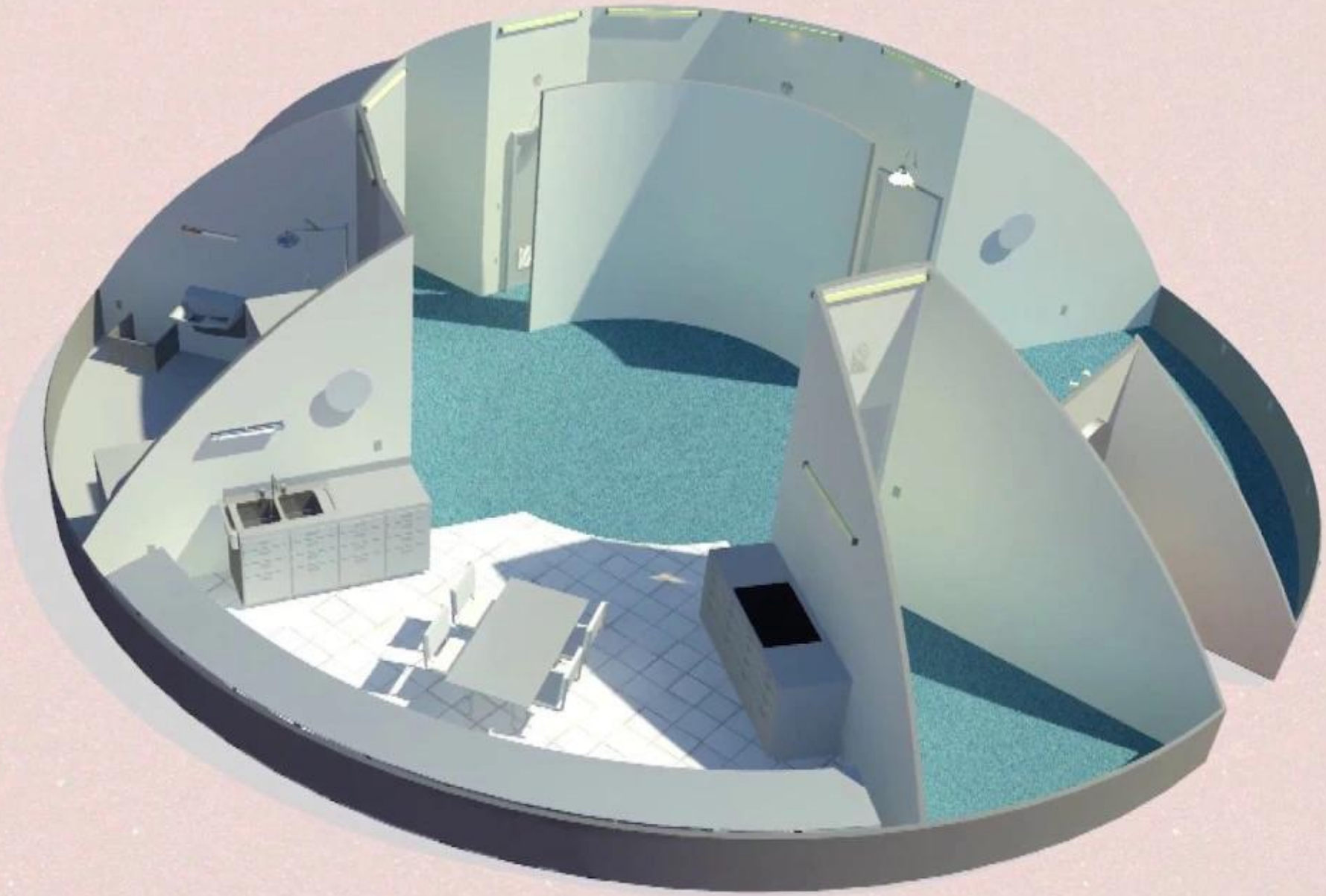

1
00:00:38,030 --> 00:00:00,579
[Music]

2
00:00:39,710 --> 00:00:38,040
northwestern's Martian habitat adopts a

3
00:00:41,690 --> 00:00:39,720
unique 3d printable Inner Sphere

4
00:00:43,729 --> 00:00:41,700
closed-shell an outer parabolic dome

5
00:00:46,130 --> 00:00:43,739
through the utilization of space

6
00:00:48,170 --> 00:00:46,140
material and constructability the

7
00:00:50,720 --> 00:00:48,180
habitat is set apart creating the

8
00:00:52,280 --> 00:00:50,730
superior internal environment stable and

9
00:00:52,700 --> 00:00:52,290
protected against the harsh from Martian

10
00:00:54,680 --> 00:00:52,710
environment

11
00:01:01,010 --> 00:00:54,690
this is made possible by three

12
00:01:02,630 --> 00:01:01,020
distinguishing features the first key

13
00:01:04,100 --> 00:01:02,640

aspect is the internal state of the

14
00:01:05,719 --> 00:01:04,110
structure which is made possible by

15
00:01:07,880 --> 00:01:05,729
printing over an inflatable pressure

16
00:01:10,130 --> 00:01:07,890
vessel an essential part of the cargo

17
00:01:11,960 --> 00:01:10,140
brought to Mars this allows our 3d

18
00:01:13,490 --> 00:01:11,970
printer to create a suspended geometry

19
00:01:15,889 --> 00:01:13,500
without jeopardizing the structural

20
00:01:17,780 --> 00:01:15,899
integrity during the build process this

21
00:01:19,490 --> 00:01:17,790
pressure vessel will also later serve as

22
00:01:21,320 --> 00:01:19,500
the primary barrier for maintaining an

23
00:01:25,040 --> 00:01:21,330
internal atmosphere which the structure

24
00:01:26,749 --> 00:01:25,050
itself could not hold the law the second

25
00:01:28,940 --> 00:01:26,759
feature of note is our entryway system

26
00:01:30,290 --> 00:01:28,950
the entryways extend from opposite ends

27
00:01:32,060 --> 00:01:30,300
of the structure and serve as the

28
00:01:33,980 --> 00:01:32,070
primary entrances and connections for

29
00:01:35,570 --> 00:01:33,990
astronauts rovers and equipment that

30
00:01:37,910 --> 00:01:35,580
will be essential for the daily work on

31
00:01:39,890 --> 00:01:37,920
Mars these connections are laid out on

32
00:01:43,910 --> 00:01:39,900
the main axis to permit future junctions

33
00:01:45,440 --> 00:01:43,920
with other pod units the last major

34
00:01:47,149 --> 00:01:45,450
component to highlight are the cross

35
00:01:49,429 --> 00:01:47,159
beams that form the main structural

36
00:01:50,960 --> 00:01:49,439
backbone of the dome these beams have

37
00:01:53,120 --> 00:01:50,970
been optimized for the required strength

38
00:01:54,890 --> 00:01:53,130

under reduced gravity loading and Mars

39
00:01:57,230 --> 00:01:54,900
level wind loads while providing an

40
00:01:58,609 --> 00:01:57,240
adequate factor of safety they will be

41
00:02:00,679 --> 00:01:58,619
printed in tandem with the pressure

42
00:02:01,390 --> 00:02:00,689
vessel thus providing continuous shape

43
00:02:06,679 --> 00:02:01,400
and strength

44
00:02:11,640 --> 00:02:09,389
the interior layout is where this design

45
00:02:13,680 --> 00:02:11,650
truly sets itself apart the entire

46
00:02:16,410 --> 00:02:13,690
interior is based off of separating wet

47
00:02:17,790 --> 00:02:16,420
areas from dry areas wet rooms such as

48
00:02:19,350 --> 00:02:17,800
the lab in the kitchen are on the

49
00:02:21,809 --> 00:02:19,360
opposite side of the habitat for the dry

50
00:02:23,460 --> 00:02:21,819
rooms such as the bedrooms this allows

51
00:02:25,199 --> 00:02:23,470
for a concentration of plumbing and

52
00:02:27,030 --> 00:02:25,209
mechanical units within the wet side of

53
00:02:29,190 --> 00:02:27,040
the habitat which decreases the overall

54
00:02:31,229 --> 00:02:29,200
amount of resources necessary to create

55
00:02:32,729 --> 00:02:31,239
this habitat as well as eliminates

56
00:02:36,479 --> 00:02:32,739
excess materials running through the

57
00:02:38,039 --> 00:02:36,489
structures and floors and walls the

58
00:02:39,839 --> 00:02:38,049
placement of the various rooms in our

59
00:02:41,640 --> 00:02:39,849
habitat also demonstrates an intuitive

60
00:02:43,710 --> 00:02:41,650
understanding of how astronauts would

61
00:02:45,240 --> 00:02:43,720
move around and use the space the

62
00:02:47,309 --> 00:02:45,250
concentration of the bedrooms and

63
00:02:49,380 --> 00:02:47,319

bathroom alongside an interior hallway

64
00:02:51,449 --> 00:02:49,390
creates privacy and allows for further

65
00:02:53,640 --> 00:02:51,459
separation not only of the wet and dry

66
00:02:55,920 --> 00:02:53,650
sections but also of the public and

67
00:02:58,410 --> 00:02:55,930
private our public wing includes the

68
00:03:00,330 --> 00:02:58,420
main living area workstation kitchen and

69
00:03:01,880 --> 00:03:00,340
laboratory and the private wing is

70
00:03:04,530 --> 00:03:01,890
composed of the bedrooms and bathroom

71
00:03:06,150 --> 00:03:04,540
privacy is necessary for astronauts who

72
00:03:08,339 --> 00:03:06,160
will be living in close quarters for an

73
00:03:10,319 --> 00:03:08,349
extended period of time this goal is

74
00:03:12,090 --> 00:03:10,329
achieved by creating a central wall that

75
00:03:13,349 --> 00:03:12,100
acts as a hallway barrier to separate

76
00:03:15,660 --> 00:03:13,359
the bedrooms from the rest of the space

77
00:03:17,640 --> 00:03:15,670
the wall will act functionally as a

78
00:03:19,289 --> 00:03:17,650
retractable divider which can be used to

79
00:03:21,449 --> 00:03:19,299
create a quieter entryway towards the

80
00:03:23,340 --> 00:03:21,459
bedrooms or can be adjusted to direct

81
00:03:25,530 --> 00:03:23,350
movement between adjacent attached units

82
00:03:27,390 --> 00:03:25,540
the sizing of the different areas was

83
00:03:29,610 --> 00:03:27,400
informed by the NASA high seas Mars

84
00:03:31,650 --> 00:03:29,620
habitat and the spherical shape allows

85
00:03:37,650 --> 00:03:31,660
the rooms to fit into a well spaced but

86
00:03:42,040 --> 00:03:40,059
additionally this design affords the

87
00:03:44,260 --> 00:03:42,050
ability to combine multiple units into a

88
00:03:46,000 --> 00:03:44,270

large community of habitats the two

89
00:03:46,420 --> 00:03:46,010
hatch openings directly across from each

90
00:03:48,190 --> 00:03:46,430
other

91
00:03:50,290 --> 00:03:48,200
allow for easy connection at either end

92
00:03:51,790 --> 00:03:50,300
and with the creation of a central node

93
00:03:53,470 --> 00:03:51,800
building would lead to an expansive

94
00:04:05,100 --> 00:03:53,480
community that traverses the Martian

95
00:04:08,550 --> 00:04:07,170
our vision of the Larson habitat

96
00:04:10,530 --> 00:04:08,560
combines effective structural

97
00:04:12,630 --> 00:04:10,540
engineering the ability to build using

98
00:04:14,160 --> 00:04:12,640
martian materials an intuitive floor

99
00:04:15,960 --> 00:04:14,170
plan that creates private and public

100
00:04:18,030 --> 00:04:15,970
spaces while combining mechanical

101
00:04:19,740 --> 00:04:18,040
systems printer construction and the

102
00:04:22,200 --> 00:04:19,750
ability to connect habitats to create a

103
00:04:23,850 --> 00:04:22,210
community on the planet's surface we

104
00:04:25,650 --> 00:04:23,860
believe that future Martian expeditions

105
00:04:27,690 --> 00:04:25,660
can benefit from our design to complete

106
00:04:30,330 --> 00:04:27,700
NASA's mission to explore the universe

107
00:04:32,010 --> 00:04:30,340
and search for life and to inspire the

108
00:04:54,010 --> 00:04:32,020
next generation of explorers as only