1
00:00:08,629 --> 00:00:06,389
hi my name is nikki werkheiser and i'm

2
00:00:10,950 --> 00:00:08,639
nasa's in-space manufacturing project

3
00:00:12,310 --> 00:00:10,960
manager and we're here today in marshall

4
00:00:14,470 --> 00:00:12,320
space flight center's additive

5
00:00:16,790 --> 00:00:14,480
manufacturing laboratory

6
00:00:18,230 --> 00:00:16,800
last year we launched the first ever 3d

7
00:00:20,310 --> 00:00:18,240
printer to the international space

8
00:00:22,230 --> 00:00:20,320
station the objective of the in-space

9
00:00:24,710 --> 00:00:22,240
manufacturing initiative is to develop

10
00:00:26,470 --> 00:00:24,720
the technologies and capabilities needed

11
00:00:28,790 --> 00:00:26,480
to make whatever we need wherever we

12
00:00:31,830 --> 00:00:28,800
might be on exploration missions whether

13
00:00:33,270 --> 00:00:31,840

it be mars or asteroids today is a very

14
00:00:35,670 --> 00:00:33,280
exciting day at marshall space flight

15
00:00:38,150 --> 00:00:35,680
center we will be unboxing the first

16
00:00:39,910 --> 00:00:38,160
ever flight samples that were printed on

17
00:00:42,229 --> 00:00:39,920
the international space station orbiting

18
00:00:44,790 --> 00:00:42,239
around 200 miles above the earth we'll

19
00:00:47,270 --> 00:00:44,800
be once we unbox these we'll be actually

20
00:00:49,270 --> 00:00:47,280
performing a detailed test plan uh we'll

21
00:00:51,670 --> 00:00:49,280
be analyzing those flight samples

22
00:00:53,910 --> 00:00:51,680
compared to ground controls that we

23
00:00:55,670 --> 00:00:53,920
printed on earth before the printer was

24
00:00:57,830 --> 00:00:55,680
launched to space station

25
00:00:59,990 --> 00:00:57,840
here with me today i have quincy bean

26
00:01:02,790 --> 00:01:00,000
who is our nasa in-space manufacturing

27
00:01:05,030 --> 00:01:02,800
principal investigator and greg st john

28
00:01:06,870 --> 00:01:05,040
who is our quality insurance inspector

29
00:01:09,429 --> 00:01:06,880
who will verify that we follow all the

30
00:01:11,190 --> 00:01:09,439
processes and controls when we handle

31
00:01:14,070 --> 00:01:11,200
the flight samples

32
00:01:16,390 --> 00:01:14,080
so uh yeah in front of me we have a

33
00:01:18,149 --> 00:01:16,400
a box that contains the first ever parts

34
00:01:19,190 --> 00:01:18,159
that were built off of the earth's

35
00:01:21,670 --> 00:01:19,200
surface they're built on the

36
00:01:29,670 --> 00:01:21,680
international space station

37
00:01:29,680 --> 00:01:33,270
all right

38
00:01:36,950 --> 00:01:35,030

more paperwork

39
00:01:44,030 --> 00:01:36,960
another copy of the

40
00:01:51,350 --> 00:01:46,469
a lot of foam

41
00:01:55,910 --> 00:01:53,590
looks like uh wow

42
00:01:58,230 --> 00:01:55,920
they're sealed up pretty good

43
00:01:59,910 --> 00:01:58,240
some scissors would help

44
00:02:01,670 --> 00:01:59,920
they don't want to cut into the

45
00:02:08,070 --> 00:02:01,680
bags that they're in double bagged with

46
00:02:10,630 --> 00:02:09,029
this

47
00:02:13,990 --> 00:02:10,640
just picks up a little bit

48
00:02:18,710 --> 00:02:16,869
let's see this is um

49
00:02:20,869 --> 00:02:18,720
zero one eight

50
00:02:23,990 --> 00:02:20,879
this was a tensile or it's a tensile

51
00:02:29,030 --> 00:02:26,949
we use this to test mechanical samples

52
00:02:31,750 --> 00:02:29,040
zero one four

53
00:02:34,470 --> 00:02:31,760
tinsel coupon three no

54
00:02:37,910 --> 00:02:34,480
nasa ames cubesat part

55
00:02:39,190 --> 00:02:37,920
a little clip for a cubesat

56
00:02:40,869 --> 00:02:39,200
so this one

57
00:02:42,470 --> 00:02:40,879
is pretty interesting it's a ratchet

58
00:02:45,430 --> 00:02:42,480
that was built

59
00:02:46,470 --> 00:02:45,440
and it was also uplinked uh from the

60
00:02:49,430 --> 00:02:46,480
ground

61
00:02:52,390 --> 00:02:49,440
it wasn't on the printer

62
00:02:55,509 --> 00:02:52,400
on the printer's memory to begin with

63
00:02:58,229 --> 00:02:55,519

let's see how this one turned out

64
00:02:59,750 --> 00:02:58,239
actually looks pretty good

65
00:03:01,030 --> 00:02:59,760
so this ratchet's actually supposed to

66
00:03:02,790 --> 00:03:01,040
move i don't want to mess with it too

67
00:03:04,790 --> 00:03:02,800
much right now

68
00:03:07,589 --> 00:03:04,800
but it's really just kind of a

69
00:03:09,750 --> 00:03:07,599
a proof of concept that you can build

70
00:03:11,910 --> 00:03:09,760
functional parts in space so the

71
00:03:14,070 --> 00:03:11,920
astronauts if they need if they need a

72
00:03:15,750 --> 00:03:14,080
ratchet or whatever other tool they

73
00:03:18,070 --> 00:03:15,760
might need

74
00:03:20,470 --> 00:03:18,080
they could just build it on demand and

75
00:03:25,750 --> 00:03:20,480
not have to wait a month or two for the

76
00:03:29,350 --> 00:03:27,430
zero one zero

77
00:03:32,710 --> 00:03:29,360
zero one nine

78
00:03:42,550 --> 00:03:32,720
zero one seven

79
00:03:47,270 --> 00:03:45,350
this one i'm just excited to see

80
00:03:50,309 --> 00:03:47,280
because it was actually built

81
00:03:53,190 --> 00:03:50,319
with several cantilevers

82
00:03:55,750 --> 00:03:53,200
with no support structure

83
00:03:57,190 --> 00:03:55,760
now so with this we'll see how

84
00:03:59,670 --> 00:03:57,200
how far

85
00:04:01,110 --> 00:03:59,680
how much of an overhang we can build and

86
00:04:02,470 --> 00:04:01,120
still make a

87
00:04:04,070 --> 00:04:02,480
geometrically

88
00:04:06,869 --> 00:04:04,080

good quality part

89
00:04:08,390 --> 00:04:06,879
my favorite part out of all of these

90
00:04:10,789 --> 00:04:08,400
so yeah now that we have everything out

91
00:04:12,949 --> 00:04:10,799
of the box

92
00:04:14,869 --> 00:04:12,959
we'll start testing them

93
00:04:16,949 --> 00:04:14,879
so first they'll go uh for well first

94
00:04:19,349 --> 00:04:16,959
they'll get their pictures taken

95
00:04:21,189 --> 00:04:19,359
and uh so we can get an official

96
00:04:22,950 --> 00:04:21,199
comparison of the the ground control

97
00:04:24,790 --> 00:04:22,960
samples which you've already

98
00:04:26,230 --> 00:04:24,800
taken those pictures

99
00:04:27,909 --> 00:04:26,240
so if there's any

100
00:04:29,030 --> 00:04:27,919
difference between the part any visible

101
00:04:31,110 --> 00:04:29,040
difference

102
00:04:31,990 --> 00:04:31,120
uh then we'll be able to to take note of

103
00:04:33,430 --> 00:04:32,000
that

104
00:04:35,350 --> 00:04:33,440
and then they'll go through what's

105
00:04:38,950 --> 00:04:35,360
called a structured light scanning

106
00:04:40,550 --> 00:04:38,960
and so it'll scan the outer geometry

107
00:04:42,870 --> 00:04:40,560
and then compare that back to the

108
00:04:45,749 --> 00:04:42,880
original cad model we really want to

109
00:04:47,270 --> 00:04:45,759
find out if there's any difference

110
00:04:49,030 --> 00:04:47,280
in how the layers

111
00:04:52,550 --> 00:04:49,040
adhere to each other in microgravity

112
00:04:54,310 --> 00:04:52,560
versus 1g and the printer is still on

113
00:04:56,230 --> 00:04:54,320

the space station it's

114
00:04:57,670 --> 00:04:56,240
we're gearing up for phase two we have

115
00:05:01,110 --> 00:04:57,680
more um

116
00:05:04,310 --> 00:05:01,120
more practical parts rather than just um

117
00:05:06,629 --> 00:05:04,320
this is mostly test test coupons uh so

118
00:05:08,550 --> 00:05:06,639
the next phase of prints will be

119
00:05:10,070 --> 00:05:08,560
uh practical coupons more like the

120
00:05:12,230 --> 00:05:10,080
ratchet

121
00:05:15,350 --> 00:05:12,240
but different different tools