



**SPACESTATION
LIVE**

1
00:00:08,629 --> 00:00:06,470
we've come a long way since those star

2
00:00:11,270 --> 00:00:08,639
trek days of just pretending to build

3
00:00:13,270 --> 00:00:11,280
things in space the reality is that a 3d

4
00:00:14,709 --> 00:00:13,280
printer has worked on the space station

5
00:00:16,630 --> 00:00:14,719
and now it's getting us closer to

6
00:00:18,070 --> 00:00:16,640
building the tools we need for a journey

7
00:00:20,470 --> 00:00:18,080
to mars

8
00:00:22,550 --> 00:00:20,480
back in november of 2014

9
00:00:24,550 --> 00:00:22,560
main space and nasa marshall began the

10
00:00:25,990 --> 00:00:24,560
first set of prints and that i went down

11
00:00:27,910 --> 00:00:26,000
history as the first thing ever

12
00:00:29,669 --> 00:00:27,920
manufactured off planet earth it's a

13
00:00:31,189 --> 00:00:29,679

very interesting

14

00:00:33,190 --> 00:00:31,199

feeling to

15

00:00:34,630 --> 00:00:33,200

you know to know that we were part of

16

00:00:36,790 --> 00:00:34,640

this big effort

17

00:00:38,869 --> 00:00:36,800

to to do something that has been talked

18

00:00:40,470 --> 00:00:38,879

about for decades it's been science

19

00:00:42,790 --> 00:00:40,480

fiction wrote about manufacturing in

20

00:00:45,430 --> 00:00:42,800

space even before nasa started looking

21

00:00:47,670 --> 00:00:45,440

at it and then to be able to come in and

22

00:00:49,750 --> 00:00:47,680

and just be a part of an effort like

23

00:00:51,110 --> 00:00:49,760

that is just amazing so how has it

24

00:00:54,389 --> 00:00:51,120

worked

25

00:00:56,790 --> 00:00:54,399

did

26

00:00:58,389 --> 00:00:56,800

a lot of that is is a testament to the

27

00:01:00,389 --> 00:00:58,399

work that went into it before we

28

00:01:02,549 --> 00:01:00,399

launched so we did a flight

29

00:01:04,390 --> 00:01:02,559

opportunities program with nasa to fly

30

00:01:06,870 --> 00:01:04,400

the printers in zero gravity on

31

00:01:08,469 --> 00:01:06,880

parabolic aircraft flights so we knew

32

00:01:10,630 --> 00:01:08,479

that the technology had a pretty good

33

00:01:12,789 --> 00:01:10,640

chance of working and once we got on

34

00:01:14,070 --> 00:01:12,799

station we started doing a test campaign

35

00:01:16,310 --> 00:01:14,080

where we printed a lot of different

36

00:01:17,990 --> 00:01:16,320

types of

37

00:01:19,749 --> 00:01:18,000

print articles that are now back on the

38

00:01:21,910 --> 00:01:19,759

ground and we're putting them through

39

00:01:24,469 --> 00:01:21,920

tests and learning about the differences

40

00:01:26,550 --> 00:01:24,479

between manufacturing and microgravity

41

00:01:28,310 --> 00:01:26,560

compared to earth yeah that's what i was

42

00:01:31,190 --> 00:01:28,320

going to ask is it that much different

43

00:01:33,590 --> 00:01:31,200

than 3d printing here on earth

44

00:01:35,510 --> 00:01:33,600

so at this point we we have not found

45

00:01:37,910 --> 00:01:35,520

any significant differences in the way

46

00:01:40,069 --> 00:01:37,920

our our printers are performing

47

00:01:41,830 --> 00:01:40,079

all that really means is that we that

48

00:01:44,310 --> 00:01:41,840

we're getting nominal operation out of

49

00:01:46,230 --> 00:01:44,320

our our machine so we've designed it to

50

00:01:48,469 --> 00:01:46,240

work in microgravity and the tests are

51
00:01:50,149 --> 00:01:48,479
showing that indeed it does work in

52
00:01:52,789 --> 00:01:50,159
microgravity what are some of the

53
00:01:54,469 --> 00:01:52,799
impressive things you've printed

54
00:01:56,870 --> 00:01:54,479
my favorite thing by far that we've

55
00:01:58,950 --> 00:01:56,880
printed is a ratchet and you can

56
00:02:01,030 --> 00:01:58,960
you can find some really nice images of

57
00:02:03,270 --> 00:02:01,040
astronaut butch wilmore holding his

58
00:02:04,630 --> 00:02:03,280
ratchet on the space station and that's

59
00:02:06,630 --> 00:02:04,640
a part that has

60
00:02:09,109 --> 00:02:06,640
multiple parts inside there's a gear and

61
00:02:11,670 --> 00:02:09,119
it's an actual ratcheting tool it's

62
00:02:14,070 --> 00:02:11,680
rated torque rated for nasa and

63
00:02:16,550 --> 00:02:14,080

everything that picture was taken two

64

00:02:19,030 --> 00:02:16,560

hours after we sent the digital file of

65

00:02:20,150 --> 00:02:19,040

the tool to the printer so from in two

66

00:02:22,150 --> 00:02:20,160

hours we

67

00:02:24,150 --> 00:02:22,160

uplinked the instructions to a 3d

68

00:02:25,910 --> 00:02:24,160

printer on the space station printed the

69

00:02:27,270 --> 00:02:25,920

tool out and then butch is holding it in

70

00:02:29,110 --> 00:02:27,280

his hand and that's

71

00:02:30,790 --> 00:02:29,120

that is there's no absolutely no other

72

00:02:32,869 --> 00:02:30,800

way to get something into the space

73

00:02:34,390 --> 00:02:32,879

station that quickly even if that tool

74

00:02:36,630 --> 00:02:34,400

was launched on a rocket at the same

75

00:02:38,390 --> 00:02:36,640

time that we sent the the digital file

76

00:02:40,710 --> 00:02:38,400

it would have been days later that it

77

00:02:42,309 --> 00:02:40,720

would have been unpacked and and usable

78

00:02:44,710 --> 00:02:42,319

what we've done is we've demonstrated

79

00:02:46,470 --> 00:02:44,720

that in an exploration mission

80

00:02:48,710 --> 00:02:46,480

we can actually use this technology and

81

00:02:50,150 --> 00:02:48,720

rely on it and as we move forward we'll

82

00:02:52,150 --> 00:02:50,160

continue to demonstrate and build

83

00:02:53,830 --> 00:02:52,160

confidence this was

84

00:02:55,589 --> 00:02:53,840

obviously a test it's obviously the

85

00:02:57,030 --> 00:02:55,599

beginning of a much bigger picture so we

86

00:02:58,790 --> 00:02:57,040

have a lot of work to do

87

00:03:00,710 --> 00:02:58,800

and when i say we i mean main space and

88

00:03:03,910 --> 00:03:00,720

nasa together understanding how this

89

00:03:05,830 --> 00:03:03,920

works and building out new tests and

90

00:03:07,190 --> 00:03:05,840

really building confidence in the whole

91

00:03:09,350 --> 00:03:07,200

process

92

00:03:11,190 --> 00:03:09,360

really at the end of the day it's about