



1  
00:00:04,640 --> 00:00:03,889  
when you put a human being in a

2  
00:00:07,629 --> 00:00:04,650  
spacesuit

3  
00:00:11,900 --> 00:00:07,639  
suddenly the impossible is possible

4  
00:00:14,450 --> 00:00:11,910  
since 1965 nASA has conducted hundreds

5  
00:00:18,590 --> 00:00:14,460  
of EPA's short for extra vehicular

6  
00:00:22,279 --> 00:00:18,600  
activity so when I think of EBA I think

7  
00:00:24,859 --> 00:00:22,289  
of the symbolism of a fellow human being

8  
00:00:27,950 --> 00:00:24,869  
existing for even just a short period of

9  
00:00:30,349 --> 00:00:27,960  
time alone and separated from nearly

10  
00:00:32,229 --> 00:00:30,359  
everything else and I think of that

11  
00:00:34,850 --> 00:00:32,239  
symbol of that single person

12  
00:00:37,900 --> 00:00:34,860  
representing our species and

13  
00:00:41,690 --> 00:00:37,910

representing our voyage of exploration

14

00:00:43,700 --> 00:00:41,700

before exploration can take place before

15

00:00:46,130 --> 00:00:43,710

a human being can step outside the

16

00:00:48,830 --> 00:00:46,140

spacecraft another mission must be

17

00:00:56,500 --> 00:00:48,840

accomplished the creation of the

18

00:01:01,939 --> 00:00:59,720

throughout the history of every NASA

19

00:01:04,850 --> 00:01:01,949

has sought to build the best spacesuit

20

00:01:07,670 --> 00:01:04,860

and tools to match the job required for

21

00:01:10,820 --> 00:01:07,680

the mission for our suit engineers this

22

00:01:14,029 --> 00:01:10,830

means designing testing and redesigning

23

00:01:15,649 --> 00:01:14,039

to get it right during Gemini our

24

00:01:18,260 --> 00:01:15,659

designers were faced with a tough

25

00:01:20,539 --> 00:01:18,270

challenge to create the very first u.s.

26  
00:01:22,460 --> 00:01:20,549  
space suits suits that would allow

27  
00:01:25,149 --> 00:01:22,470  
astronauts to work outside the

28  
00:01:27,950 --> 00:01:25,159  
spacecraft in low-earth orbit

29  
00:01:30,050 --> 00:01:27,960  
building on that experience new suits

30  
00:01:32,930 --> 00:01:30,060  
were developed for the Apollo missions

31  
00:01:35,210 --> 00:01:32,940  
this time astronauts needed to walk on

32  
00:01:38,240 --> 00:01:35,220  
the moon while carrying their own life

33  
00:01:41,029 --> 00:01:38,250  
support on their backs with planetary

34  
00:01:43,730 --> 00:01:41,039  
surface exploration is the objective the

35  
00:01:48,380 --> 00:01:43,740  
suit had to bend and move to facilitate

36  
00:01:51,109 --> 00:01:48,390  
tool use and protect the human during

37  
00:01:53,380 --> 00:01:51,119  
the shuttle years NASA redefined what

38  
00:01:56,539 --> 00:01:53,390

could be done with EDA suits and tools

39

00:01:57,680 --> 00:01:56,549

retrieving broken satellites rescuing

40

00:02:00,650 --> 00:01:57,690

and rebuilding the Hubble Space

41

00:02:02,900 --> 00:02:00,660

Telescope and building the International

42

00:02:06,320 --> 00:02:02,910

Space Station the same shuttle spacesuit

43

00:02:08,809 --> 00:02:06,330

is on the space station today it allows

44

00:02:11,690 --> 00:02:08,819

us to maintain and repair our home in

45

00:02:15,320 --> 00:02:11,700

space but what about future missions

46

00:02:17,199 --> 00:02:15,330

what kind of a suit will we need will we

47

00:02:20,270 --> 00:02:17,209

be walking on a planetary surface

48

00:02:23,000 --> 00:02:20,280

floating in microgravity

49

00:02:24,920 --> 00:02:23,010

both NASA is already investigating the

50

00:02:27,440 --> 00:02:24,930

next generation of spacesuits

51  
00:02:29,000 --> 00:02:27,450  
creating a variety of prototypes to

52  
00:02:35,450 --> 00:02:29,010  
prepare astronauts for the journeys

53  
00:02:37,820 --> 00:02:35,460  
ahead the z2 is one of those prototypes

54  
00:02:40,190 --> 00:02:37,830  
it's sleek design looks different from

55  
00:02:42,560 --> 00:02:40,200  
any other spacesuit NASA previously

56  
00:02:45,410 --> 00:02:42,570  
built we were able to take some artistic

57  
00:02:47,990 --> 00:02:45,420  
license on this prototype spacesuit and

58  
00:02:50,390 --> 00:02:48,000  
have some fun with it and engage folks

59  
00:02:52,370 --> 00:02:50,400  
out around the country for what they

60  
00:02:54,140 --> 00:02:52,380  
would like to see in a spacesuit we work

61  
00:02:56,870 --> 00:02:54,150  
with Philadelphia University to do the

62  
00:02:59,120 --> 00:02:56,880  
initial layouts of the suit and then we

63  
00:03:02,330 --> 00:02:59,130

have some in-house fashion designers

64

00:03:04,100 --> 00:03:02,340

that also help build our spacesuits and

65

00:03:07,400 --> 00:03:04,110

they were able to bring their

66

00:03:09,470 --> 00:03:07,410

experiences to it and evolve that cover

67

00:03:12,350 --> 00:03:09,480

layer to make it even better than what

68

00:03:15,290 --> 00:03:12,360

we started with the z2 isn't just

69

00:03:17,560 --> 00:03:15,300

fashion-forward on the outside it's also

70

00:03:20,660 --> 00:03:17,570

technologically advanced on the inside

71

00:03:23,000 --> 00:03:20,670

this is one suit made for walking on

72

00:03:24,470 --> 00:03:23,010

other planets that is to be a planetary

73

00:03:25,970 --> 00:03:24,480

spacesuit some of the special features

74

00:03:27,440 --> 00:03:25,980

on the z2 are boots

75

00:03:28,910 --> 00:03:27,450

specifically designed for walking and

76

00:03:31,610 --> 00:03:28,920

for keeping your foot integrated into

77

00:03:33,770 --> 00:03:31,620

the boot well like a good hiking boot it

78

00:03:36,229 --> 00:03:33,780

also has a lot of lower torso mobility

79

00:03:38,060 --> 00:03:36,239

that allows you to walk naturally so

80

00:03:40,220 --> 00:03:38,070

that you can go uphill downhill into

81

00:03:43,190 --> 00:03:40,230

craters pick up a rock as a geologist

82

00:03:45,740 --> 00:03:43,200

want to do on a planetary surface like

83

00:03:48,289 --> 00:03:45,750

any prototype NASA hopes to learn a lot

84

00:03:51,620 --> 00:03:48,299

from the z2 as it continues to improve

85

00:03:53,150 --> 00:03:51,630

and develop spacesuits prototypes are

86

00:03:54,680 --> 00:03:53,160

really important for spacesuit

87

00:03:56,900 --> 00:03:54,690

development because you can only do so

88

00:03:59,600 --> 00:03:56,910

much in the modeling and analysis world

89

00:04:01,460 --> 00:03:59,610

you really don't know how well the suit

90

00:04:03,229 --> 00:04:01,470

works until you integrated with a person

91

00:04:05,330 --> 00:04:03,239

you get the feedback that person can

92

00:04:07,069 --> 00:04:05,340

give you you have them walk around you

93

00:04:08,860 --> 00:04:07,079

have them try different tests that's how

94

00:04:12,580 --> 00:04:08,870

we really know that we've done a good

95

00:04:14,949 --> 00:04:12,590

design a spaceship another suit in the

96

00:04:19,090 --> 00:04:14,959

works is the prototype exploration suit

97

00:04:21,729 --> 00:04:19,100

or pxs this suit could be used for EVs

98

00:04:25,120 --> 00:04:21,739

in microgravity or it could be further

99

00:04:27,909 --> 00:04:25,130

modified for walking on planets as with

100

00:04:30,969 --> 00:04:27,919

all future spacesuits NASA is wanting to

101  
00:04:34,540 --> 00:04:30,979  
see better mobility more visibility and

102  
00:04:36,189 --> 00:04:34,550  
better control and communication so one

103  
00:04:38,260 --> 00:04:36,199  
of my main responsibilities on the space

104  
00:04:39,790 --> 00:04:38,270  
suit is the suit control assembly and

105  
00:04:41,379 --> 00:04:39,800  
that's the box that sits right here on

106  
00:04:43,540 --> 00:04:41,389  
the front of the suit and it allows the

107  
00:04:45,520 --> 00:04:43,550  
crew member to control their life

108  
00:04:47,260 --> 00:04:45,530  
support components such as their cooling

109  
00:04:49,420 --> 00:04:47,270  
and their pressure and it also controls

110  
00:04:52,000 --> 00:04:49,430  
a lot of the electronics such as the

111  
00:04:53,469 --> 00:04:52,010  
radio and the volume and they can see

112  
00:04:54,879 --> 00:04:53,479  
some of the data that's coming back and

113  
00:04:57,370 --> 00:04:54,889

forth from the suit computer to that

114

00:05:00,070 --> 00:04:57,380

display so one of the great things about

115

00:05:02,500 --> 00:05:00,080

this job is that after designing the Box

116

00:05:04,270 --> 00:05:02,510

I'm able to get into the suit since it's

117

00:05:07,230 --> 00:05:04,280

one of the smaller sizes and we can

118

00:05:10,750 --> 00:05:07,240

actually see what the limitations are

119

00:05:12,730 --> 00:05:10,760

you know with my own hands and eyes and

120

00:05:14,290 --> 00:05:12,740

not just hear that secondhand from

121

00:05:16,089 --> 00:05:14,300

another test subject that would be

122

00:05:17,620 --> 00:05:16,099

looking at the same data and then to

123

00:05:19,839 --> 00:05:17,630

take that back and then to go build the

124

00:05:21,580 --> 00:05:19,849

next prototype and you know incorporate

125

00:05:26,440 --> 00:05:21,590

the changes that need to be made so that

126

00:05:30,879 --> 00:05:26,450

it works better the next time whether

127

00:05:33,969 --> 00:05:30,889

it's the pxs or the z2 new NASA space

128

00:05:35,860 --> 00:05:33,979

suits have a big job to do and if not

129

00:05:39,010 --> 00:05:35,870

just being in a vacuum but it's very hot

130

00:05:40,060 --> 00:05:39,020

it can be very cold and then in addition

131

00:05:42,370 --> 00:05:40,070

to that there are a little micro

132

00:05:43,980 --> 00:05:42,380

meteoroids that are flying past that you

133

00:05:45,900 --> 00:05:43,990

have to protect in case it does

134

00:05:48,029 --> 00:05:45,910

the suit so so there's a lot of things

135

00:05:50,189 --> 00:05:48,039

to go into protecting the crew member in

136

00:05:52,529 --> 00:05:50,199

addition to just being in a vacuum and

137

00:05:54,390 --> 00:05:52,539

when we go farther to the Moon or Mars

138

00:05:56,189 --> 00:05:54,400

you have to protect encase you trip and

139

00:05:59,879 --> 00:05:56,199

fall so there's a lot of protection that

140

00:06:03,240 --> 00:05:59,889

the suit has to take into account no

141

00:06:06,059 --> 00:06:03,250

matter where we go or what we do space

142

00:06:09,659 --> 00:06:06,069

suits and EDA tasks will continue to

143

00:06:12,330 --> 00:06:09,669

change and evolve to keep up space suit

144

00:06:15,240 --> 00:06:12,340

engineers will use new technologies new

145

00:06:17,189 --> 00:06:15,250

materials and new ideas to help us on

146

00:06:20,400 --> 00:06:17,199

our way in the future I'm looking

147

00:06:23,310 --> 00:06:20,410

forward to spacesuits that are much more

148

00:06:25,439 --> 00:06:23,320

of a tool flash not that is more

149

00:06:27,629 --> 00:06:25,449

integrated with the human and is less of

150

00:06:31,189 --> 00:06:27,639

a encumbrance and more of a help

151

00:06:33,779 --> 00:06:31,199

I think of EBA as basically a ship of

152

00:06:36,469 --> 00:06:33,789

exploration a ship of learning and

153

00:06:39,060 --> 00:06:36,479

understanding both about what makes us

154

00:06:43,290 --> 00:06:39,070

individually human and about what makes

155

00:06:46,020 --> 00:06:43,300

us together a team that seeks to learn

156

00:06:48,540 --> 00:06:46,030

and understand what the truth around us

157

00:06:51,490 --> 00:06:48,550

is and that search for knowledge that

158

00:06:54,400 --> 00:06:51,500

search for truth is I think one of the