

A woman with long blonde hair, wearing a dark blazer, is speaking and gesturing with her hands. She is positioned in front of a complex piece of industrial machinery, likely a 3D printer, which features various dials, gauges, and ports. The machinery is metallic and has several circular openings. The background shows a workshop or laboratory setting with shelves and equipment.

Niki Werkheiser
NASA Project Manager, 3-D Printing in Space Project

1
00:00:05,670 --> 00:00:03,590
later this year a 3d printer will be

2
00:00:07,909 --> 00:00:05,680
heading to the space station this was a

3
00:00:11,589 --> 00:00:07,919
partnership between a commercial company

4
00:00:13,749 --> 00:00:11,599
called made in space and nasa's marshall

5
00:00:15,669 --> 00:00:13,759
space flight center so we would like to

6
00:00:17,430 --> 00:00:15,679
have the camera move to the cm bill

7
00:00:19,990 --> 00:00:17,440
hebscher spoke with mike snyder of

8
00:00:22,070 --> 00:00:20,000
maidenspace and nikki werkheiser from

9
00:00:23,830 --> 00:00:22,080
marshall to find out more about working

10
00:00:28,150 --> 00:00:23,840
with small businesses on projects like

11
00:00:31,589 --> 00:00:30,470
main space you know the goal the company

12
00:00:33,510 --> 00:00:31,599
is to

13
00:00:35,110 --> 00:00:33,520

advance manufacturing to space so that

14

00:00:37,910 --> 00:00:35,120

way we can change the logistics chain so

15

00:00:40,470 --> 00:00:37,920

it's easier to get there and me you know

16

00:00:42,229 --> 00:00:40,480

personally i'm a colonization advocate i

17

00:00:44,470 --> 00:00:42,239

realize that it's very important that we

18

00:00:46,630 --> 00:00:44,480

start expanding as a species not just

19

00:00:47,510 --> 00:00:46,640

exploring but staying there and this is

20

00:00:49,590 --> 00:00:47,520

one

21

00:00:50,950 --> 00:00:49,600

technology that's very crucial to that

22

00:00:53,430 --> 00:00:50,960

happening and it's going to benefit

23

00:00:55,590 --> 00:00:53,440

exploration and colonization and the

24

00:00:57,750 --> 00:00:55,600

things being produced uh can help

25

00:00:59,349 --> 00:00:57,760

research on earth let's shift gears a

26

00:01:01,270 --> 00:00:59,359

little bit can you tell me a bit about

27

00:01:02,709 --> 00:01:01,280

your partnership with marshall they're

28

00:01:04,789 --> 00:01:02,719

really crucial we talk to them all the

29

00:01:06,310 --> 00:01:04,799

time and there's great people here at

30

00:01:08,149 --> 00:01:06,320

marshall that you know helped us along

31

00:01:10,230 --> 00:01:08,159

the way with anything we we needed

32

00:01:12,710 --> 00:01:10,240

marshall has been crucial uh to this

33

00:01:14,710 --> 00:01:12,720

development process uh after our phase

34

00:01:17,350 --> 00:01:14,720

one we got actually during our phase one

35

00:01:19,990 --> 00:01:17,360

sbir we we talked to them and they were

36

00:01:22,550 --> 00:01:20,000

really interested actually uh ken cooper

37

00:01:23,990 --> 00:01:22,560

who was based here right now uh flew a

38

00:01:25,830 --> 00:01:24,000

uh uh

39

00:01:27,590 --> 00:01:25,840

added manufacturing device in the late

40

00:01:29,590 --> 00:01:27,600

90s aboard uh

41

00:01:31,109 --> 00:01:29,600

the vomit comet and so there was

42

00:01:32,789 --> 00:01:31,119

definite interest here already and we

43

00:01:35,510 --> 00:01:32,799

talked to ken early in the before we

44

00:01:36,950 --> 00:01:35,520

even worked the sbir actually understand

45

00:01:38,469 --> 00:01:36,960

you know what he learned from his

46

00:01:40,390 --> 00:01:38,479

experience what are some of the tools

47

00:01:42,069 --> 00:01:40,400

that you expect to be made using this

48

00:01:43,990 --> 00:01:42,079

device i guess the better question that

49

00:01:45,030 --> 00:01:44,000

one was what tools can't be made with a

50

00:01:46,310 --> 00:01:45,040

device

51
00:01:49,590 --> 00:01:46,320
you could do pretty much anything with

52
00:01:51,429 --> 00:01:49,600
3d printing it's very very unique

53
00:01:52,710 --> 00:01:51,439
technology capability because you can

54
00:01:54,710 --> 00:01:52,720
create geometries that you wouldn't be

55
00:01:56,550 --> 00:01:54,720
able to machine traditionally

56
00:01:57,590 --> 00:01:56,560
and that's really awesome because the

57
00:02:00,149 --> 00:01:57,600
best things that are going to come out

58
00:02:01,590 --> 00:02:00,159
of this i haven't thought of yet because

59
00:02:03,190 --> 00:02:01,600
people are opening just opening the door

60
00:02:05,109 --> 00:02:03,200
to new capabilities and understanding

61
00:02:06,550 --> 00:02:05,119
how it works and it's getting really

62
00:02:08,070 --> 00:02:06,560
cool in the future to see what people

63
00:02:10,229 --> 00:02:08,080

come up with currently with the

64

00:02:12,309 --> 00:02:10,239

technology demonstration we're using abs

65

00:02:14,790 --> 00:02:12,319

plastic the future generation of printer

66

00:02:16,710 --> 00:02:14,800

that goes up next year of a wide arrange

67

00:02:19,030 --> 00:02:16,720

of thermal polymers and some of those

68

00:02:21,030 --> 00:02:19,040

are aerospace grade this printer works

69

00:02:23,750 --> 00:02:21,040

like many added manufacturing devices

70

00:02:25,430 --> 00:02:23,760

work on the ground it deposits material

71

00:02:26,869 --> 00:02:25,440

layer upon layer and builds up a

72

00:02:28,949 --> 00:02:26,879

three-dimensional object think about a

73

00:02:30,869 --> 00:02:28,959

glue gun at home you know you just press

74

00:02:32,630 --> 00:02:30,879

the button and it you know squirts out

75

00:02:34,309 --> 00:02:32,640

if you kept going you can create objects

76

00:02:36,150 --> 00:02:34,319

in three dimensions that way and that's

77

00:02:38,229 --> 00:02:36,160

pretty much how the printer works uh the

78

00:02:41,830 --> 00:02:38,239

next step for us is this is a technology

79

00:02:43,990 --> 00:02:41,840

demonstration to uh uh to see if if it

80

00:02:45,430 --> 00:02:44,000

works properly and reduce risk for our

81

00:02:48,630 --> 00:02:45,440

commercial platform that goes up next

82

00:02:50,630 --> 00:02:48,640

year and that will be able to uh

83

00:02:52,229 --> 00:02:50,640

let anyone build what they want on

84

00:02:53,270 --> 00:02:52,239

station which is really exciting and

85

00:02:55,190 --> 00:02:53,280

really quick you can do it really

86

00:02:56,790 --> 00:02:55,200

quickly instead of waiting you know six

87

00:02:59,190 --> 00:02:56,800

months to a year for your rocket to go

88

00:03:01,110 --> 00:02:59,200

up you just press a button and

89

00:03:03,110 --> 00:03:01,120

your parts there the future rad

90

00:03:05,350 --> 00:03:03,120

manufacturing space in my opinion is

91

00:03:07,509 --> 00:03:05,360

very bright we're just now getting off

92

00:03:09,670 --> 00:03:07,519

the ground uh with this technology and

93

00:03:11,589 --> 00:03:09,680

utilizing it so pretty soon in the

94

00:03:13,350 --> 00:03:11,599

future we're gonna be able to build more

95

00:03:15,350 --> 00:03:13,360

useful things up there that are bigger

96

00:03:18,070 --> 00:03:15,360

and more complex with more components

97

00:03:19,589 --> 00:03:18,080

more materials and you know sooner

98

00:03:22,070 --> 00:03:19,599

sooner rather than later we'll be able

99

00:03:24,229 --> 00:03:22,080

to build you know spaceships up there uh

100

00:03:25,350 --> 00:03:24,239

it might seem far-fetched right now but

101
00:03:27,190 --> 00:03:25,360
if you think about how far the

102
00:03:29,030 --> 00:03:27,200
technology has gone the last 10 years

103
00:03:30,869 --> 00:03:29,040
and just expand that it's not out of the

104
00:03:33,110 --> 00:03:30,879
realm of possibilities which is really

105
00:03:35,750 --> 00:03:33,120
exciting uh because we need to get off

106
00:03:37,110 --> 00:03:35,760
this planet and explore and colonize and

107
00:03:39,110 --> 00:03:37,120
when we do that we're going to have so

108
00:03:40,710 --> 00:03:39,120
many benefits to the terrestrial

109
00:03:42,630 --> 00:03:40,720
environment that they're going to

110
00:03:44,630 --> 00:03:42,640
outweigh the the amount of effort it's

111
00:03:46,630 --> 00:03:44,640
going to take to get these type of

112
00:03:49,190 --> 00:03:46,640
technologies up there and working in

113
00:03:51,350 --> 00:03:49,200

space the 3d printer is the very first

114

00:03:54,229 --> 00:03:51,360

step toward realizing an in-space

115

00:03:56,229 --> 00:03:54,239

manufacturing suite of capabilities

116

00:03:57,990 --> 00:03:56,239

the printer is key and crucial to that

117

00:04:00,229 --> 00:03:58,000

we'll be doing multiple materials in the

118

00:04:01,589 --> 00:04:00,239

future we're starting with this abs

119

00:04:03,190 --> 00:04:01,599

plastic which is what you see in like

120

00:04:04,470 --> 00:04:03,200

legos for example

121

00:04:06,789 --> 00:04:04,480

but from there we'll move to other

122

00:04:08,710 --> 00:04:06,799

thermoplastics stronger thermoplastics

123

00:04:10,630 --> 00:04:08,720

that can do different types of parts in

124

00:04:12,630 --> 00:04:10,640

addition to that we'll eventually have a

125

00:04:13,670 --> 00:04:12,640

metals capability metals are a little

126

00:04:15,750 --> 00:04:13,680

trickier we're starting with the

127

00:04:17,270 --> 00:04:15,760

plastics because a lot of what you see

128

00:04:19,430 --> 00:04:17,280

on the ground for the metals will be a

129

00:04:20,710 --> 00:04:19,440

powder base you have a real fine powder

130

00:04:21,990 --> 00:04:20,720

that you use

131

00:04:23,749 --> 00:04:22,000

and we haven't figured out how to

132

00:04:26,070 --> 00:04:23,759

manipulate that in microgravity the

133

00:04:28,070 --> 00:04:26,080

powders are very hard to control

134

00:04:30,230 --> 00:04:28,080

so there are other processes that we're

135

00:04:33,110 --> 00:04:30,240

examining but in addition to that we

136

00:04:35,189 --> 00:04:33,120

just awarded two other phase one sbirs

137

00:04:37,830 --> 00:04:35,199

on a whole new topic related in space

138

00:04:40,150 --> 00:04:37,840

manufacturing uh we you can imagine in

139

00:04:42,870 --> 00:04:40,160

space flying up the feedstock is still a

140

00:04:44,629 --> 00:04:42,880

supply chain that we would like to

141

00:04:46,469 --> 00:04:44,639

be able to get rid of so one thing we're

142

00:04:48,310 --> 00:04:46,479

doing is we have a phase 1 sbr we just

143

00:04:49,430 --> 00:04:48,320

awarded to maiden space and tethers

144

00:04:51,030 --> 00:04:49,440

unlimited

145

00:04:52,550 --> 00:04:51,040

to look at how you would take the small

146

00:04:55,510 --> 00:04:52,560

plastic part that we print and you

147

00:04:57,510 --> 00:04:55,520

recycle it back into the raw feed stock

148

00:04:59,590 --> 00:04:57,520

so that is a very exciting day we would

149

00:05:01,350 --> 00:04:59,600

be you know sustainable in that case and

150

00:05:03,909 --> 00:05:01,360

then do the testing necessary how many

151
00:05:05,510 --> 00:05:03,919
times can you reuse and redo that one

152
00:05:07,670 --> 00:05:05,520
day what we'd like to be able to do is

153
00:05:09,510 --> 00:05:07,680
is turn things like our old food

154
00:05:10,469 --> 00:05:09,520
wrappers and water bottles on station

155
00:05:12,629 --> 00:05:10,479
the trash

156
00:05:14,550 --> 00:05:12,639
into feedstock and print from those so

157
00:05:16,310 --> 00:05:14,560
we'll be cranking that phase one sbr

158
00:05:19,029 --> 00:05:16,320
process up it's another example of how

159
00:05:21,270 --> 00:05:19,039
the sbr has been the perfect mechanism

160
00:05:22,469 --> 00:05:21,280
for this type of uh capability

161
00:05:24,230 --> 00:05:22,479
development

162
00:05:26,469 --> 00:05:24,240
so and then you even think bigger you

163
00:05:29,029 --> 00:05:26,479

start thinking about things um external

164

00:05:31,990 --> 00:05:29,039

to space station uh things like building

165

00:05:33,590 --> 00:05:32,000

trusses or large structures antenna

166

00:05:35,110 --> 00:05:33,600

many of the things that we build on the

167

00:05:37,270 --> 00:05:35,120

ground that we fly in space large

168

00:05:39,430 --> 00:05:37,280

structures like antenna or hubble space

169

00:05:41,189 --> 00:05:39,440

telescope when you're designing those

170

00:05:42,629 --> 00:05:41,199

you really have to kind of imagine what

171

00:05:44,790 --> 00:05:42,639

that environment will be in space and

172

00:05:45,670 --> 00:05:44,800

try to design for that but if you could

173

00:05:47,590 --> 00:05:45,680

actually

174

00:05:49,189 --> 00:05:47,600

build these things in space in the

175

00:05:51,270 --> 00:05:49,199

environment you're operating in you can

176

00:05:52,870 --> 00:05:51,280

build them to just that environment so

177

00:05:54,550 --> 00:05:52,880

it's kind of a mentality shift and a

178

00:05:55,749 --> 00:05:54,560

whole new way of thinking

179

00:05:57,749 --> 00:05:55,759

we have things like printable

180

00:05:59,029 --> 00:05:57,759

electronics that are in work on the

181

00:06:00,309 --> 00:05:59,039

ground that we would like to be able to

182

00:06:03,110 --> 00:06:00,319

translate

183

00:06:05,350 --> 00:06:03,120

into into space as well as things like

184

00:06:07,270 --> 00:06:05,360

in-space repair something like i know a

185

00:06:09,189 --> 00:06:07,280

lot of people seem to maybe gravity but

186

00:06:10,629 --> 00:06:09,199

mmod the micrometeorite damage is

187

00:06:12,710 --> 00:06:10,639

something we do worry about it could

188

00:06:15,990 --> 00:06:12,720

happen so this would be a way to