
PAO

1
00:00:04,710 --> 00:00:03,350
i'm here with robert pickle who's one of

2
00:00:06,789 --> 00:00:04,720
our robotics controllers who's going to

3
00:00:08,150 --> 00:00:06,799
be working with the rrm mission uh

4
00:00:10,310 --> 00:00:08,160
robert thanks so much for being here

5
00:00:12,230 --> 00:00:10,320
with me today first off tell us a little

6
00:00:13,190 --> 00:00:12,240
bit about our on this robotic refueling

7
00:00:15,829 --> 00:00:13,200
mission what are you guys hoping to

8
00:00:18,470 --> 00:00:15,839
accomplish with this sure so this is a

9
00:00:20,150 --> 00:00:18,480
goddard develop payload and uh

10
00:00:22,310 --> 00:00:20,160
their ultimate goal is to do satellite

11
00:00:24,550 --> 00:00:22,320
servicing missions what this payload is

12
00:00:26,390 --> 00:00:24,560
is on the iss and they utilize the

13
00:00:27,589 --> 00:00:26,400

robotic

14
00:00:30,310 --> 00:00:27,599
components that are already up there the

15
00:00:32,790 --> 00:00:30,320
ssrms and spdm and they built a bunch of

16
00:00:34,549 --> 00:00:32,800
task specific tools and adapters

17
00:00:37,270 --> 00:00:34,559
and have interfaces similar to what is

18
00:00:39,110 --> 00:00:37,280
found on uh satellites and so we've done

19
00:00:40,709 --> 00:00:39,120
over the course of the last couple years

20
00:00:42,950 --> 00:00:40,719
multiple tasks

21
00:00:44,869 --> 00:00:42,960
what we have coming up are some

22
00:00:45,910 --> 00:00:44,879
some of the finer tasks

23
00:00:48,790 --> 00:00:45,920
um

24
00:00:49,990 --> 00:00:48,800
so for for this payload uh for the tasks

25
00:00:52,709 --> 00:00:50,000
we have coming up they have a tool

26
00:00:55,189 --> 00:00:52,719
specific for uh cutting wires

27
00:00:57,110 --> 00:00:55,199
and actually cutting um mli tape and

28
00:00:58,869 --> 00:00:57,120
what mli is basically thermal blanketing

29
00:01:00,630 --> 00:00:58,879
on a bunch of payloads

30
00:01:02,310 --> 00:01:00,640
and they have basically torque set

31
00:01:03,750 --> 00:01:02,320
screws

32
00:01:04,789 --> 00:01:03,760
just like a regular screw you would see

33
00:01:05,990 --> 00:01:04,799
and then they have essentially a

34
00:01:07,910 --> 00:01:06,000
screwdriver

35
00:01:10,070 --> 00:01:07,920
and we're going to unthread some screws

36
00:01:12,789 --> 00:01:10,080
both caged and uncaged and caged being

37
00:01:14,230 --> 00:01:12,799
that they can uh put a cage around the

38
00:01:16,149 --> 00:01:14,240

screws and unthread them in space so

39
00:01:17,749 --> 00:01:16,159
they can float around and not escape and

40
00:01:20,870 --> 00:01:17,759
then uncaged if they're they're not

41
00:01:22,310 --> 00:01:20,880
covered okay and you first just getting

42
00:01:24,469 --> 00:01:22,320
back real quick you mentioned a wire

43
00:01:25,990 --> 00:01:24,479
cutter tool screws a lot of this stuff

44
00:01:27,350 --> 00:01:26,000
you know

45
00:01:29,109 --> 00:01:27,360
it's my understanding satellites aren't

46
00:01:30,789 --> 00:01:29,119
really made to be refueled is that

47
00:01:32,630 --> 00:01:30,799
correct that is correct

48
00:01:34,710 --> 00:01:32,640
so uh

49
00:01:36,710 --> 00:01:34,720
in the in the future their goal is you

50
00:01:38,789 --> 00:01:36,720
know once they get into the servicing

51
00:01:40,789 --> 00:01:38,799
business they'll build the satellites to

52
00:01:42,389 --> 00:01:40,799
be more compatible

53
00:01:44,310 --> 00:01:42,399
what they built these tools is to

54
00:01:45,990 --> 00:01:44,320
actually do tasks that weren't

55
00:01:48,069 --> 00:01:46,000
necessarily originally designed to be

56
00:01:49,590 --> 00:01:48,079
compatible with robots

57
00:01:51,270 --> 00:01:49,600
all right and what are some of the

58
00:01:53,910 --> 00:01:51,280
specific tasks you guys are looking to

59
00:01:56,230 --> 00:01:53,920
accomplish this week

60
00:01:59,429 --> 00:01:56,240
this week like i was saying for we're

61
00:02:01,350 --> 00:01:59,439
going to cut and manipulate some mli

62
00:02:02,630 --> 00:02:01,360
and then also they have some mli that's

63
00:02:03,910 --> 00:02:02,640

velcro down we're going to grab and

64
00:02:06,069 --> 00:02:03,920
manipulate

65
00:02:07,350 --> 00:02:06,079
we're going to unthread some screws

66
00:02:10,309 --> 00:02:07,360
and they have a

67
00:02:12,229 --> 00:02:10,319
an array bed of essentially uh uh

68
00:02:13,589 --> 00:02:12,239
coaxial connectors

69
00:02:15,670 --> 00:02:13,599
and we're gonna go remove some of these

70
00:02:17,190 --> 00:02:15,680
coaxial connectors and on satellites

71
00:02:19,350 --> 00:02:17,200
what this is is basically their little

72
00:02:21,350 --> 00:02:19,360
test bed that they could uh connect up

73
00:02:22,470 --> 00:02:21,360
and run some diagnostic tests on the

74
00:02:24,949 --> 00:02:22,480
satellites

75
00:02:26,150 --> 00:02:24,959
okay and as a robotics controller here

76
00:02:27,750 --> 00:02:26,160
in mission control houston you're going

77
00:02:29,510 --> 00:02:27,760
to be controlling all of that that's

78
00:02:32,070 --> 00:02:29,520
correct um

79
00:02:34,550 --> 00:02:32,080
so we'll be controlling ssrms which is

80
00:02:36,869 --> 00:02:34,560
essentially a 56 foot long manipulator

81
00:02:39,030 --> 00:02:36,879
and which is holding the spdm pretty big

82
00:02:41,350 --> 00:02:39,040
arm yeah which is essentially those two

83
00:02:43,750 --> 00:02:41,360
things combined makes it about 70 feet

84
00:02:45,830 --> 00:02:43,760
long and we'll be grabbing tools and

85
00:02:47,589 --> 00:02:45,840
then adapters and doing the fine tasks

86
00:02:49,350 --> 00:02:47,599
of basically unthreading a screwdriver

87
00:02:52,550 --> 00:02:49,360
from 70 feet away from where your base

88
00:02:53,990 --> 00:02:52,560

is wow and all that from you know 250

89
00:02:57,030 --> 00:02:54,000
miles down here on the ground that's

90
00:02:58,710 --> 00:02:57,040
correct very exciting stuff um so i mean

91
00:02:59,910 --> 00:02:58,720
real quick what kind of

92
00:03:01,350 --> 00:02:59,920
i don't want to try and get too

93
00:03:02,790 --> 00:03:01,360
technical what kind of interface do you

94
00:03:04,470 --> 00:03:02,800
guys have with this do you have like a

95
00:03:06,309 --> 00:03:04,480
camera system on there

96
00:03:09,350 --> 00:03:06,319
how exactly do you

97
00:03:10,869 --> 00:03:09,360
control this arm sure so uh on the space

98
00:03:13,509 --> 00:03:10,879
station there's multiple external

99
00:03:16,790 --> 00:03:13,519
cameras and then on the mss the ssrm has

100
00:03:17,670 --> 00:03:16,800
an spdm we have multiple cameras as well

101
00:03:19,830 --> 00:03:17,680
and then

102
00:03:22,229 --> 00:03:19,840
when goddard designed these tools what

103
00:03:24,390 --> 00:03:22,239
they also did was uh put two cameras and

104
00:03:26,149 --> 00:03:24,400
90 degrees apart on each tool which is

105
00:03:28,149 --> 00:03:26,159
basically looking directly at the work

106
00:03:30,869 --> 00:03:28,159
site area of the

107
00:03:33,110 --> 00:03:30,879
the task we're going to be doing okay so

108
00:03:35,270 --> 00:03:33,120
we'll be using iss assets and looking at

109
00:03:37,030 --> 00:03:35,280
three or four views at a time and

110
00:03:39,589 --> 00:03:37,040
so plenty of eyes on everything you're

111
00:03:41,190 --> 00:03:39,599
doing at all times okay very cool um

112
00:03:42,949 --> 00:03:41,200
after you guys get this done what are

113
00:03:44,710 --> 00:03:42,959

some of the the future tasks you know

114
00:03:46,710 --> 00:03:44,720
that are coming up soon on the horizon

115
00:03:48,550 --> 00:03:46,720
for rrm sure

116
00:03:50,229 --> 00:03:48,560
so we'll i'll back up and tell you what

117
00:03:50,949 --> 00:03:50,239
we've done in the past so far

118
00:03:52,630 --> 00:03:50,959
so

119
00:03:54,630 --> 00:03:52,640
this payload was built and they're

120
00:03:57,990 --> 00:03:54,640
calling it rrm phase one

121
00:04:00,470 --> 00:03:58,000
and uh what we've done thus far is we we

122
00:04:02,869 --> 00:04:00,480
we've went in and

123
00:04:05,350 --> 00:04:02,879
gathered imagery flying in at different

124
00:04:07,509 --> 00:04:05,360
rates and different distances

125
00:04:09,589 --> 00:04:07,519
looking at features that they integrated

126
00:04:11,589 --> 00:04:09,599
onto this payload that they'll post

127
00:04:13,030 --> 00:04:11,599
process on the ground and hopefully one

128
00:04:15,270 --> 00:04:13,040
day have vision algorithms that will

129
00:04:16,870 --> 00:04:15,280
help them rendezvous with satellites

130
00:04:19,590 --> 00:04:16,880
in addition to that there is a coolant

131
00:04:22,230 --> 00:04:19,600
valve panel that apparently has similar

132
00:04:23,189 --> 00:04:22,240
coolant valve panels found on on current

133
00:04:25,350 --> 00:04:23,199
existing

134
00:04:27,270 --> 00:04:25,360
legacy satellites or in earth

135
00:04:30,469 --> 00:04:27,280
and we went and removed some valves and

136
00:04:31,590 --> 00:04:30,479
caps and and manipulated plugs

137
00:04:33,270 --> 00:04:31,600
and then

138
00:04:34,950 --> 00:04:33,280

there's a fill drain valve a common

139
00:04:37,110 --> 00:04:34,960
field drain mount found on a lot of

140
00:04:38,870 --> 00:04:37,120
satellites that are on orbit and we went

141
00:04:41,270 --> 00:04:38,880
and cut wires removed caps and actually

142
00:04:43,670 --> 00:04:41,280
they have a tool on this payload that

143
00:04:45,030 --> 00:04:43,680
flows fuel so we remove the tool similar

144
00:04:46,790 --> 00:04:45,040
to what you see at a gas station remove

145
00:04:48,230 --> 00:04:46,800
the tool it has a hose connected to it

146
00:04:50,390 --> 00:04:48,240
connect it up to the fuel drain valve

147
00:04:53,110 --> 00:04:50,400
and flow to ethanol so you guys have

148
00:04:54,390 --> 00:04:53,120
actually refueled this payload yes very

149
00:04:56,390 --> 00:04:54,400
exciting

150
00:04:58,870 --> 00:04:56,400
and for the future phase two they have a

151
00:05:00,550 --> 00:04:58,880
whole new set of objectives set of uh

152
00:05:02,070 --> 00:05:00,560
adapters and everything

153
00:05:03,990 --> 00:05:02,080
robert thanks so much for giving us a

154
00:05:05,350 --> 00:05:04,000
look inside what you guys are doing here