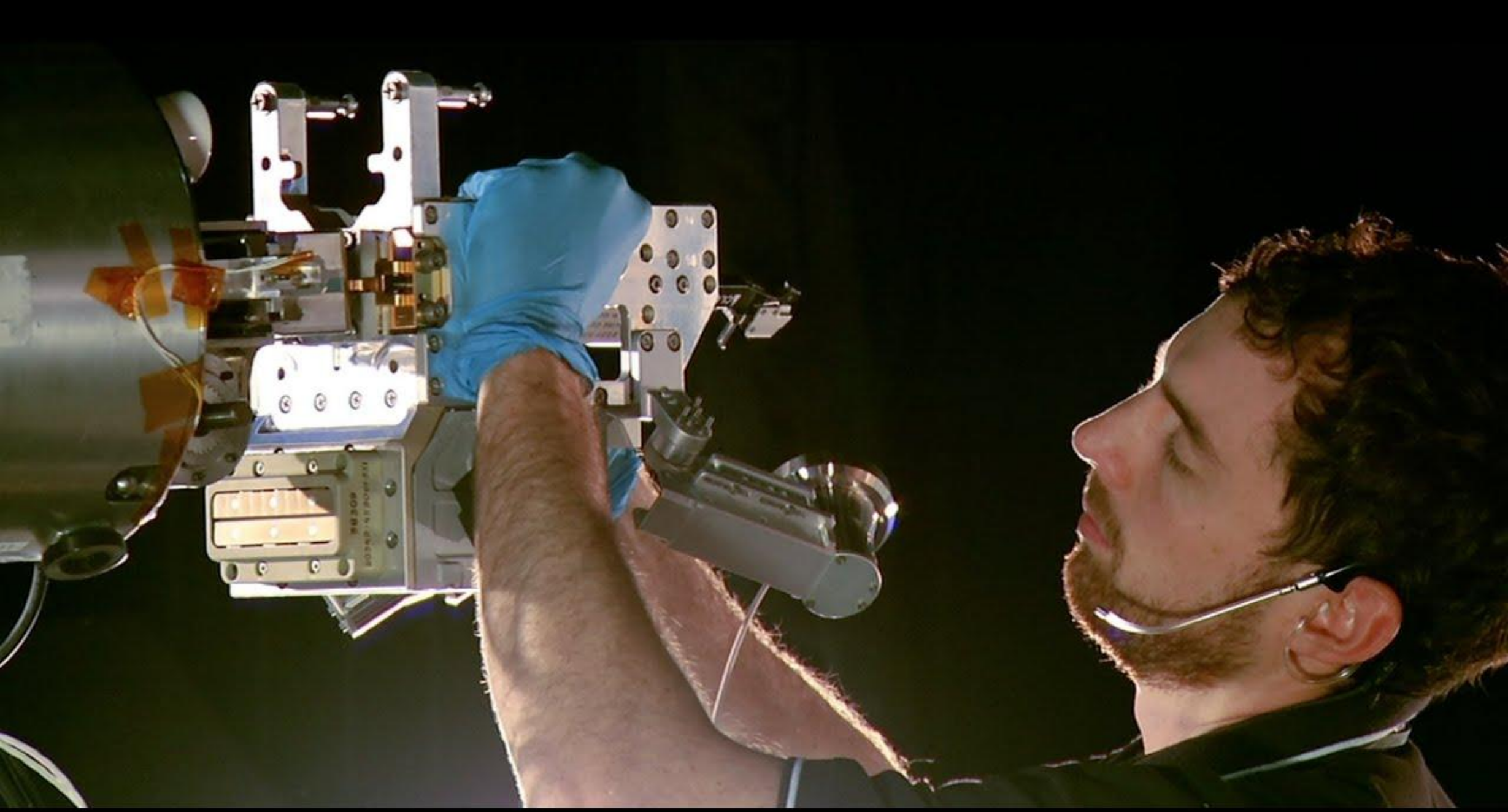

1
00:00:11,720 --> 00:00:09,920
I live for somebody to tell me you can't

2
00:00:13,910 --> 00:00:11,730
do that it'll never work but you

3
00:00:15,949 --> 00:00:13,920
wouldn't be crazy to wonder if sending a

4
00:00:19,250 --> 00:00:15,959
robot to refuel an operational

5
00:00:21,340 --> 00:00:19,260
spacecraft might run that risk but you

6
00:00:24,620 --> 00:00:21,350
know engineers have imaginations

7
00:00:27,520 --> 00:00:24,630
consider this every satellite flying

8
00:00:30,830 --> 00:00:27,530
right now is bespoke hand-wrought

9
00:00:33,560 --> 00:00:30,840
customized detailed and extremely

10
00:00:35,510 --> 00:00:33,570
expensive that's why it pays to figure

11
00:00:38,000 --> 00:00:35,520
out how to repair and refuel the things

12
00:00:40,850 --> 00:00:38,010
rather than just replace them there's

13
00:00:43,069 --> 00:00:40,860

just one problem that's hard to do just

14
00:00:45,139 --> 00:00:43,079
getting the robot to go where you want

15
00:00:46,430 --> 00:00:45,149
it to go they don't position precisely

16
00:00:48,440 --> 00:00:46,440
so you have to do things like build

17
00:00:49,400 --> 00:00:48,450
leading into the tool an astronaut could

18
00:00:51,500 --> 00:00:49,410
probably just get it right on there

19
00:00:53,690 --> 00:00:51,510
because he's right there just like

20
00:00:55,729 --> 00:00:53,700
performing at Carnegie Hall satellite

21
00:00:58,520 --> 00:00:55,739
repair missions demand rigorous practice

22
00:01:00,709 --> 00:00:58,530
and the big practice session on deck is

23
00:01:03,200 --> 00:01:00,719
called robotic refueling mission or RRM

24
00:01:05,450 --> 00:01:03,210
at Maryland's Goddard Space Flight

25
00:01:07,910 --> 00:01:05,460
Center mission planners use a motion

26
00:01:11,060 --> 00:01:07,920
simulation platform to figure out how to

27
00:01:14,000 --> 00:01:11,070
get all the parts working together when

28
00:01:17,120 --> 00:01:14,010
a robot arm clips a wire this fall it'll

29
00:01:19,070 --> 00:01:17,130
be one small snip for robots one giant

30
00:01:22,609 --> 00:01:19,080
leap in the business of space-based

31
00:01:24,260 --> 00:01:22,619
satellite servicing the last space

32
00:01:26,030 --> 00:01:24,270
shuttle flight delivered Hardware

33
00:01:28,880 --> 00:01:26,040
looking a lot like this right to

34
00:01:31,039 --> 00:01:28,890
International Space Station it's a box

35
00:01:34,219 --> 00:01:31,049
of practice equipment a busy board

36
00:01:35,840 --> 00:01:34,229
valves nozzles clamps and more to

37
00:01:39,080 --> 00:01:35,850
simulate the side of an actual satellite

38
00:01:41,749 --> 00:01:39,090

a Canadian robot called Dexter will

39
00:01:43,370 --> 00:01:41,759
interact with the practice gear it's

40
00:01:45,859 --> 00:01:43,380
different in space than here on the

41
00:01:48,109 --> 00:01:45,869
ground but that's kind of the point the

42
00:01:51,410 --> 00:01:48,119
whole thing is a learning experience a

43
00:01:53,480 --> 00:01:51,420
big one we're showing folks that we have

44
00:01:56,120 --> 00:01:53,490
the capability to use the existing robot

45
00:01:58,340 --> 00:01:56,130
it was not meant to be used with tools

46
00:02:01,190 --> 00:01:58,350
to work on our M and we've adapted those

47
00:02:03,530 --> 00:02:01,200
tools to make them compatible with the

48
00:02:05,090 --> 00:02:03,540
Dexter robot and also compatible with

49
00:02:07,730 --> 00:02:05,100
our mock satellite interfaces that we

50
00:02:10,490 --> 00:02:07,740
have on our M the robot is a very stiff

51
00:02:12,619 --> 00:02:10,500
rigid interface it's not forgiving like

52
00:02:14,360 --> 00:02:12,629
an astronauts hand when you push on

53
00:02:15,769 --> 00:02:14,370
something really hard with the robot you

54
00:02:17,330 --> 00:02:15,779
build up really large contact forces

55
00:02:19,159 --> 00:02:17,340
when the astronaut feeds on something

56
00:02:20,390 --> 00:02:19,169
his wrist might give you know that's

57
00:02:22,069 --> 00:02:20,400
he's got his own

58
00:02:24,140 --> 00:02:22,079
internal sort of software compliance

59
00:02:26,240 --> 00:02:24,150
running station astronauts won't be

60
00:02:28,819 --> 00:02:26,250
involved this will be a mission run from

61
00:02:31,520 --> 00:02:28,829
the ground our RM will demonstrate a

62
00:02:33,520 --> 00:02:31,530
number of essential tasks at the end

63
00:02:36,050 --> 00:02:33,530

it'll attempt first-of-its-kind

64
00:02:38,509 --> 00:02:36,060
simulated fuel transfer between two

65
00:02:40,759 --> 00:02:38,519
pieces of hardware not so easy when

66
00:02:43,429 --> 00:02:40,769
you're orbiting the planet at 18,000

67
00:02:46,759 --> 00:02:43,439
miles an hour it's really exciting to

68
00:02:49,670 --> 00:02:46,769
feel like you're working at the front of

69
00:02:53,390 --> 00:02:49,680
the way and the work that our team is

70
00:02:55,399 --> 00:02:53,400
doing is it's uncharted territory the

71
00:02:58,069 --> 00:02:55,409
robotic refueling mission augers a

72
00:03:00,649 --> 00:02:58,079
revolution in spacecraft operation and

73
00:03:03,379 --> 00:03:00,659
design it may be a rehearsal for bigger

74
00:03:05,780 --> 00:03:03,389
things to come but it's also a direct