1
00:00:15,829 --> 00:00:13,830
one of the most striking features of the

2
00:00:18,150 --> 00:00:15,839
james webb space telescope is the sun

3
00:00:20,470 --> 00:00:18,160
shield probably because it's about the

4
00:00:22,790 --> 00:00:20,480
size of a tennis court now that's too

5
00:00:25,670 --> 00:00:22,800
big to be sent into space that way so at

6
00:00:27,670 --> 00:00:25,680
launch it's in a folded up configuration

7
00:00:29,509 --> 00:00:27,680
when the james webb space telescope

8
00:00:30,950 --> 00:00:29,519
reaches its destination one million

9
00:00:33,110 --> 00:00:30,960
miles from earth

10
00:00:34,950 --> 00:00:33,120
the sunshield is then deployed

11
00:00:37,750 --> 00:00:34,960
different contractors are working right

12
00:00:39,670 --> 00:00:37,760
now together on a mechanism or several

13
00:00:42,150 --> 00:00:39,680

mechanisms to control the sun shields

14
00:00:44,229 --> 00:00:42,160
deployment one of those is northrop

15
00:00:46,389 --> 00:00:44,239
grumman's astro aerospace here in

16
00:00:48,310 --> 00:00:46,399
carpinteria california

17
00:00:50,869 --> 00:00:48,320
one of the lead project engineers here

18
00:00:52,310 --> 00:00:50,879
at astro airspace is larry heinlein hey

19
00:00:53,750 --> 00:00:52,320
larry so what exactly are you guys

20
00:00:55,270 --> 00:00:53,760
working on here

21
00:00:57,350 --> 00:00:55,280
this is a mid boom assembly for the

22
00:00:59,750 --> 00:00:57,360
james webb space telescope

23
00:01:02,310 --> 00:00:59,760
so what exactly is a mid boom assembly

24
00:01:04,390 --> 00:01:02,320
so there's one base tube

25
00:01:07,590 --> 00:01:04,400
and there's five deploying tubes the

26
00:01:09,830 --> 00:01:07,600
five deploying tubes deploy out and as

27
00:01:13,990 --> 00:01:09,840
they deploy out they unfold the layers

28
00:01:19,910 --> 00:01:17,429
and you have separate tubes because

29
00:01:22,310 --> 00:01:19,920
because during lunch it needs to stow

30
00:01:24,310 --> 00:01:22,320
within about five feet of length and

31
00:01:26,310 --> 00:01:24,320
when it's fully deployed it's about 25

32
00:01:30,069 --> 00:01:26,320
feet but on the end of that boom is a

33
00:01:32,870 --> 00:01:30,079
five foot long spreader bar which the

34
00:01:34,950 --> 00:01:32,880
sun shield layers are attached to oh

35
00:01:37,030 --> 00:01:34,960
okay that puts the layers of the sun

36
00:01:39,429 --> 00:01:37,040
shield in position right that's correct

37
00:01:40,390 --> 00:01:39,439
okay kind of reminds me of a antenna of

38
00:01:42,149 --> 00:01:40,400

sorts

39
00:01:45,350 --> 00:01:42,159
yes it kind of looks like your

40
00:01:46,710 --> 00:01:45,360
old-fashioned deploying antenna

41
00:01:49,429 --> 00:01:46,720
so larry how

42
00:01:50,469 --> 00:01:49,439
do you make these tubes

43
00:01:53,190 --> 00:01:50,479
extend

44
00:01:55,030 --> 00:01:53,200
well inside the carbon graphite tubes is

45
00:01:57,910 --> 00:01:55,040
something that we call the stem deployer

46
00:02:00,469 --> 00:01:57,920
and tim martinez will help explain that

47
00:02:02,870 --> 00:02:00,479
this is called a stem deployer and this

48
00:02:04,950 --> 00:02:02,880
mounts to the bottom of the base tube

49
00:02:08,389 --> 00:02:04,960
and this is what drives the assembly and

50
00:02:10,790 --> 00:02:08,399
pushes the tubes up

51
00:02:13,190 --> 00:02:10,800
and the way it works is that it pushes

52
00:02:15,510 --> 00:02:13,200
this material called stem

53
00:02:16,869 --> 00:02:15,520
out and the concept is like a tape

54
00:02:17,990 --> 00:02:16,879
measure so

55
00:02:19,670 --> 00:02:18,000
when it's

56
00:02:22,630 --> 00:02:19,680
coming out it becomes round but when

57
00:02:25,030 --> 00:02:22,640
it's around this spool that's inside

58
00:02:27,110 --> 00:02:25,040
it's flat and there's a motor that

59
00:02:29,589 --> 00:02:27,120
drives the whole thing out

60
00:02:31,750 --> 00:02:29,599
it doesn't feel very heavy and but it's

61
00:02:35,589 --> 00:02:31,760
strong yeah it's it's made out of very

62
00:02:37,350 --> 00:02:35,599
thin sheet of corrosion resistant steel

63
00:02:39,670 --> 00:02:37,360

but that's what's what's great about it

64
00:02:40,630 --> 00:02:39,680
it's really light but it can push up 100

65
00:02:42,470 --> 00:02:40,640
pounds

66
00:02:44,630 --> 00:02:42,480
and then there's also a requirement to

67
00:02:47,509 --> 00:02:44,640
pull back and so you can actually pull

68
00:02:48,630 --> 00:02:47,519
back 400 pounds and why would you even

69
00:02:51,430 --> 00:02:48,640
pull back

70
00:02:52,229 --> 00:02:51,440
once the booms are completely deployed

71
00:02:54,470 --> 00:02:52,239
it

72
00:02:57,190 --> 00:02:54,480
pulls back and the tubes are connected

73
00:02:59,190 --> 00:02:57,200
to a cable which tensions the whole

74
00:03:00,390 --> 00:02:59,200
sunshield and separates the five

75
00:03:01,670 --> 00:03:00,400
membranes