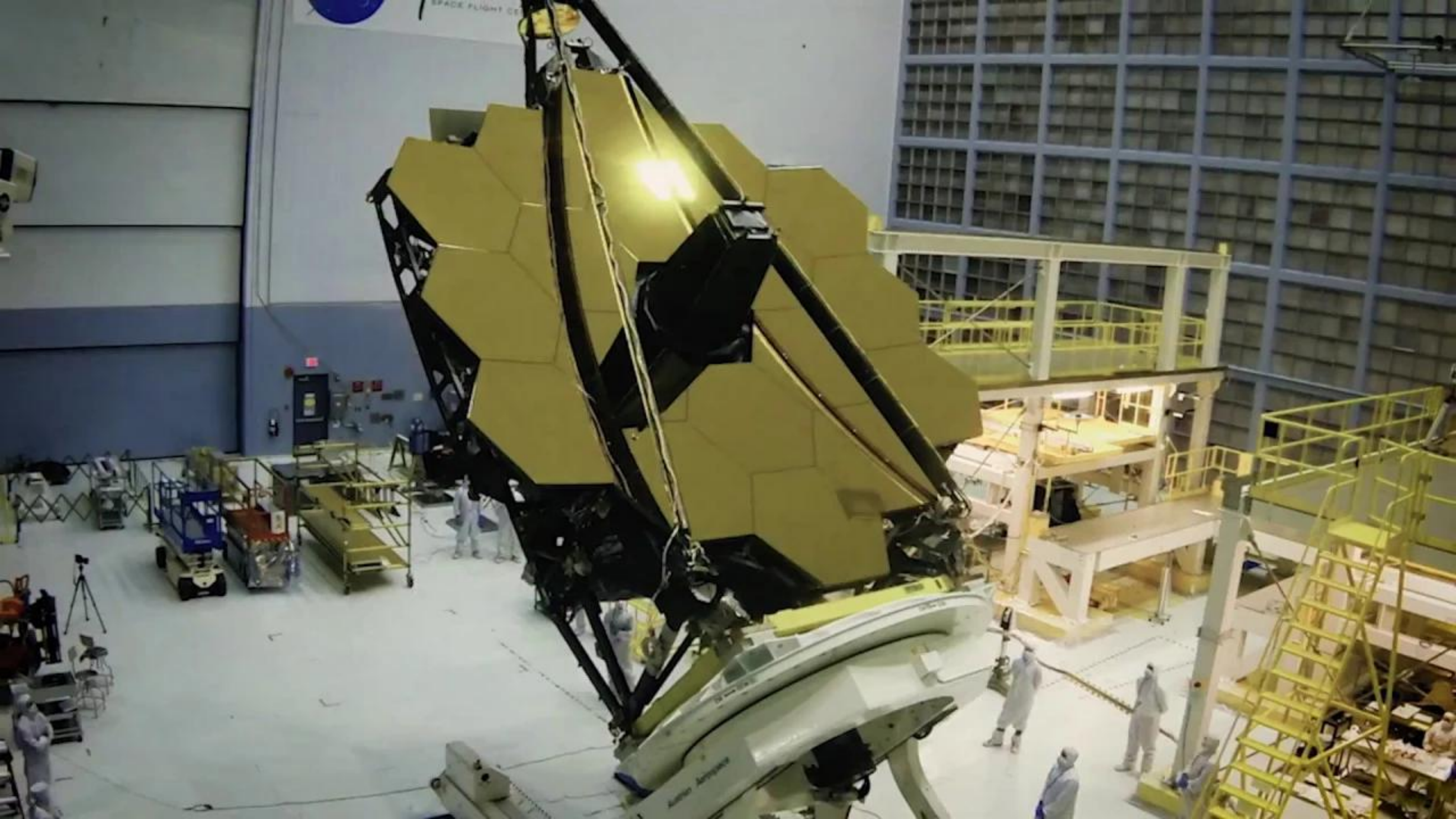

1
00:00:00,130 --> 00:00:04,170
The efforts of thousands

2
00:00:04,190 --> 00:00:08,260
of people across the United States, Canada

3
00:00:08,280 --> 00:00:12,460
and Europe, for almost two decades achieved

4
00:00:12,480 --> 00:00:16,520
this milestone. The optical and science

5
00:00:16,540 --> 00:00:20,680
segment of the largest space telescope ever constructed

6
00:00:20,700 --> 00:00:24,830
stands complete in one of the largest cleanrooms

7
00:00:24,850 --> 00:00:29,020
in the world. Ready to endure its

8
00:00:29,040 --> 00:00:33,110
toughest yet battery of testing.

9
00:00:33,130 --> 00:00:37,180
Getting to this point wasn't easy. Never mind

10
00:00:37,200 --> 00:00:41,300
the logistic and construction challenges, this international

11
00:00:41,320 --> 00:00:45,360
presents, before astrophysicists

12
00:00:45,360 --> 00:00:49,510
dreams of building Webb could be realized

13
00:00:49,520 --> 00:00:53,540

ten technologies that did not exist needed to be created

14
00:00:53,590 --> 00:00:57,650
and perfected. They were.

15
00:00:57,670 --> 00:01:01,800
To give you a sense of where we are

16
00:01:01,820 --> 00:01:05,870
in the mission, the Webb telescope consists of three

17
00:01:05,870 --> 00:01:09,900
main segments. The spacecraft bus, the sunshield and

18
00:01:09,950 --> 00:01:13,960
the telescope, which includes Webb's instruments.

19
00:01:13,980 --> 00:01:18,020
This telescope segment of NASA's

20
00:01:18,040 --> 00:01:22,140
most ambitious space observatory stands complete

21
00:01:22,140 --> 00:01:26,330
and tall in the NASA Goddard Space Flight Center cleanroom.

22
00:01:26,370 --> 00:01:30,460
An international team of engineers

23
00:01:30,480 --> 00:01:34,640
built and tested this revolutionary telescope segment.

24
00:01:34,660 --> 00:01:38,770
Beyond space flight hardware, the Webb

25
00:01:38,790 --> 00:01:42,990
mission required building assembly structures

26
00:01:43,010 --> 00:01:47,070
test facilities

27
00:01:47,090 --> 00:01:51,100
transportation enclosures.

28
00:01:51,120 --> 00:01:55,170
[music]

29
00:01:55,190 --> 00:01:59,280
Engineering copies called 'Pathfinders'

30
00:01:59,300 --> 00:02:03,490
and even a miniature

31
00:02:03,510 --> 00:02:07,670
test bed telescope. Revolutionary

32
00:02:07,690 --> 00:02:11,770
lightweight composite material capable of maintaining its shape to

33
00:02:11,790 --> 00:02:15,990
one-ten thousandth of a human hair at temperatures near absolute

34
00:02:15,990 --> 00:02:20,080
zero forms Webb's backplane and science instrument support

35
00:02:20,130 --> 00:02:24,230
structures. Webb's

36
00:02:24,250 --> 00:02:28,420
mirror segments began as beryllium ore mined in

37
00:02:28,440 --> 00:02:32,490
Utah. They crisscrossed the United States to be formed

38
00:02:32,510 --> 00:02:36,600

lightweighted

39
00:02:36,620 --> 00:02:40,780
polished

40
00:02:40,800 --> 00:02:44,880
gold coated and

41
00:02:44,900 --> 00:02:49,010
finally perfectly placed on the backplane structure

42
00:02:49,030 --> 00:02:53,200
with the help of a robotic arm.

43
00:02:53,220 --> 00:02:57,280
Four state of the art science instruments

44
00:02:57,300 --> 00:03:01,370
from NASA and its international partners, the European

45
00:03:01,390 --> 00:03:05,510
Space Agency and Canadian Space Agency, were installed

46
00:03:05,530 --> 00:03:09,730
and tested. Each loaded with advanced components

47
00:03:09,750 --> 00:03:13,810
and detectors and capable of operating at temperatures near

48
00:03:13,830 --> 00:03:17,990
absolute zero. Scientists will use these

49
00:03:18,010 --> 00:03:22,170
instruments to tease out answers to astronomical mysteries near the

50
00:03:22,190 --> 00:03:26,250
edge of the visible universe, in galaxies closer to home,

51
00:03:26,270 --> 00:03:30,430
around planets orbiting our star

52
00:03:30,450 --> 00:03:34,560
and others like it near by.

53
00:03:34,580 --> 00:03:38,770
The Webb telescope segment now stands complete.

54
00:03:38,790 --> 00:03:42,840
After launch-phase environment testing at Goddard

55
00:03:42,860 --> 00:03:46,930
this segment will endure more cryogenic testing at the

56
00:03:46,950 --> 00:03:51,070
NASA Johnson Space Center. Later the telescope

57
00:03:51,090 --> 00:03:55,260
will travel to Northrop Grumman in Los Angeles to be

58
00:03:55,280 --> 00:03:59,330
mated to its sunshield and spacecraft bus, thus

59
00:03:59,350 --> 00:04:03,460
completing the observatory's assembly. The James

60
00:04:03,480 --> 00:04:07,660
Webb Space Telescope - our new eye

61
00:04:07,680 --> 00:04:11,720
on the universe.