1
00:00:00,120 --> 00:00:07,480
The James Webb Space Telescope is moved inside this massive cryogenic vacuum chamber at NASA’s Johns

2
00:00:07,520 --> 00:00:10,800
Space Center called Chamber A.

3
00:00:17,400 --> 00:00:25,720
This chamber simulates the vacuum and super cold environment of space in which Webb will operate

4
00:00:25,720 --> 00:00:34,400
about 40 K or about minus 388 degrees Fahrenheit or minus 233 degrees Celsius

5
00:00:38,720 --> 00:00:44,560
The Webb telescope mission team uses Chamber A to further verify the entire telescope, including its

6
00:00:44,560 --> 00:00:47,260
optics and instruments, will work correctly in space.

7
00:00:48,060 --> 00:00:52,460
Part of this test includes aligning Webb’s 18 mirror segments into a perfect, monolithic mirror.

8
00:00:52,460 --> 00:00:56,280
The process is similar to the way the mirrors will be aligned in space.

9
00:00:56,500 --> 00:01:01,520
Actuators behind each mirror enable the aligning, or “phasing,” of the telescope’s 18 hexagonally shaped

10
00:01:01,520 --> 00:01:06,580
primary mirror segments to function as a single 6.5-meter mirror.

11
00:01:09,340 --> 00:01:15,000
The mirror’s actuators can move in steps that are a fraction of a wavelength of light, or about

12
00:01:15,000 --> 00:01:19,480
1/10,000th the diameter of a human hair.

13
00:01:22,640 --> 00:01:27,760

In space, a star will be used to as the light source to align the mirrors.

14
00:01:27,760 --> 00:01:33,660
Engineers will move each mirror and determine which image is coming from which mirror.

15
00:01:37,340 --> 00:01:41,180
Then, through a process called Wave Front Sensing and Control, the mirrors will be aligned and very

16
00:01:41,180 --> 00:01:43,260
finely focused.

17
00:01:43,260 --> 00:01:47,320
For this test, the Webb team uses a special laser to act as the ‘star’ and a test device called a

18
00:01:47,320 --> 00:01:50,100
multi-wavelength interferometer.

19
00:01:50,100 --> 00:01:54,260
By analyzing the interference signal between these two light beams, engineers determine the mirror shape and

20
00:01:54,260 --> 00:01:56,540
the alignment of the mirrors to within one wavelength of light.

21
00:01:58,300 --> 00:02:06,420
The James Webb Space Telescope is the scientific complement to NASA's Hubble Space Telescope.

22
00:02:06,420 --> 00:02:11,300
It will be the most powerful space telescope ever built.

23
00:02:11,300 --> 00:02:16,540
Webb is an international project led by NASA with its partners, ESA (European Space Agency) and