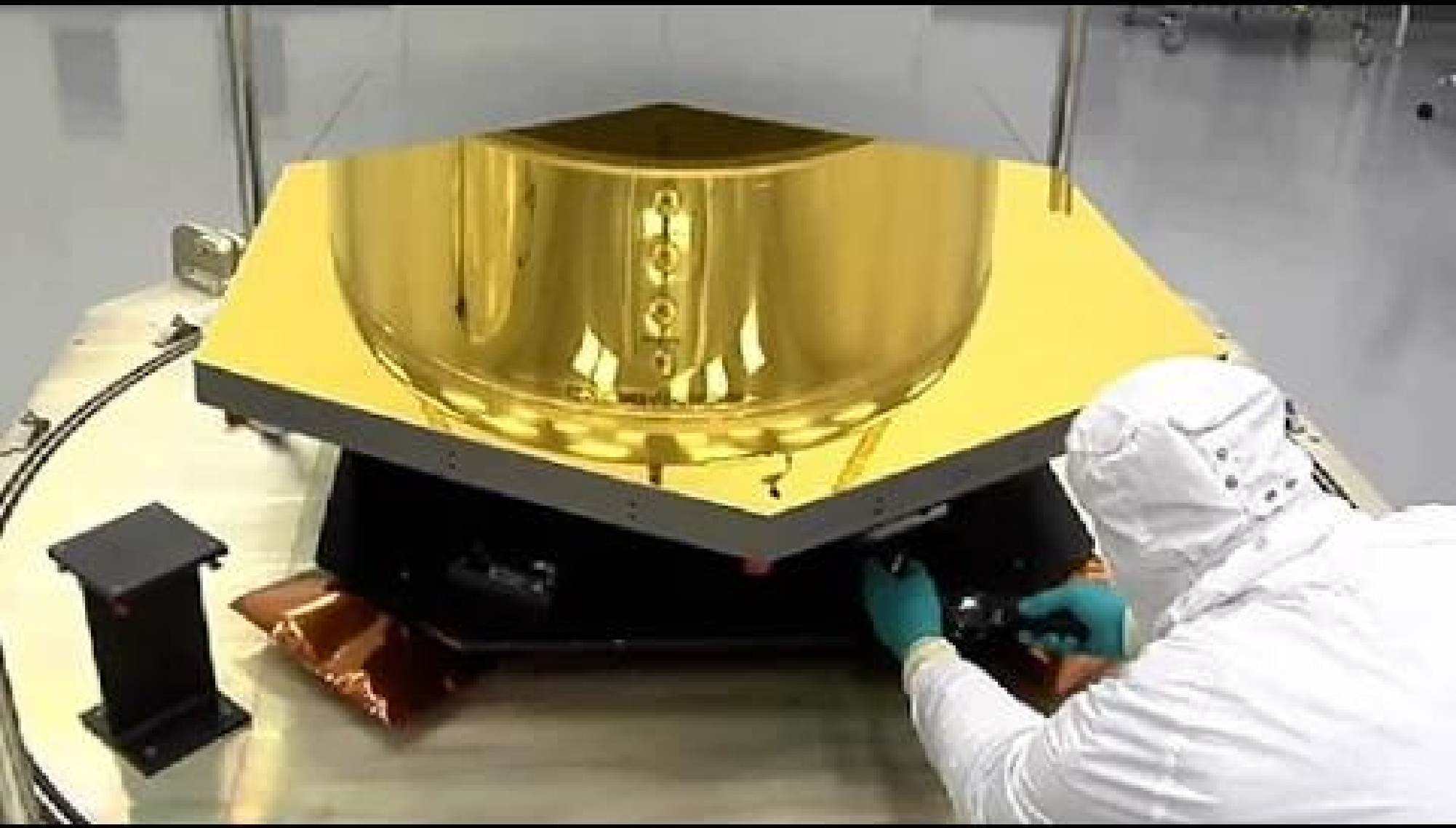

1
00:00:13,790 --> 00:00:17,300
Mary Estacion/Reporter: Mirrors on a telescope
are often coated with some kind of metal in

2
00:00:17,300 --> 00:00:20,380
order to reflect as much light as possible.

3
00:00:20,380 --> 00:00:25,060
Now the kind of metal depends upon the type
of light the tele- scope is looking at.

4
00:00:25,060 --> 00:00:30,290
The James Webb Space Telescope is looking
at infrared light and for that, gold is the

5
00:00:30,290 --> 00:00:31,700
ideal choice.

6
00:00:31,700 --> 00:00:36,180
To find out how the gold is put onto the mirrors
of the James Webb Space Telescope, we're here

7
00:00:36,180 --> 00:00:39,140
at Quantum Coating in Moorestown New Jersey.

8
00:00:39,140 --> 00:00:42,270
Mary: So Ian how much gold are we talking
about?

9
00:00:42,270 --> 00:00:43,270
Enough for a ring?

10
00:00:43,270 --> 00:00:44,270
Ian Stevenson/Director of Coating Services:
Not even that?

11
00:00:44,270 --> 00:00:46,820
Well, it depends on how big your ring is,
of course.

12
00:00:46,820 --> 00:00:50,230
But the thickness of the coating is almost
unimagineably small.

13
00:00:50,230 --> 00:00:56,040
To give an example, this piece of paper is
1/1000th of an inch.

14
00:00:56,040 --> 00:01:02,579
We could take 1000 gold coatings stack them
all side by side and they would be the thickness

15
00:01:02,579 --> 00:01:03,579
of this piece of paper.

16
00:01:03,579 --> 00:01:08,180
In terms of the amount of gold that we need,
it comes to 3 grams of material.

17
00:01:08,180 --> 00:01:14,290
Mary: And 3 grams look like this... wow, that's
amazing.

18
00:01:14,290 --> 00:01:15,880
Considering how big the mirror is.

19
00:01:15,880 --> 00:01:20,820
Ian: That amount, when it's spread out thin
enough covers the whole surface of the hexagon.

20
00:01:20,820 --> 00:01:24,080
Mary: When you apply the coating, are we talking
about a paint job?

21
00:01:24,080 --> 00:01:26,880
Ian: No, this is called vacuum deposition.

22
00:01:26,880 --> 00:01:31,190

It happens in a chamber where all the air's
been sucked out to create a vacuum and we

23
00:01:31,190 --> 00:01:33,100
vaporize the gold.

24
00:01:33,100 --> 00:01:38,460
We create a cloud of vapor and that vapor
condenses on the surface to form the film.

25
00:01:38,460 --> 00:01:41,430
Mary: And why do you choose to apply the gold
that way?

26
00:01:41,430 --> 00:01:45,280
Ian: That's the way to get the maximum reflection.

27
00:01:45,280 --> 00:01:48,200
Spray painting or other techniques wouldn't
give us enough reflection.

28
00:01:48,200 --> 00:01:52,430
Mary: Can we actually see the gold being applied
to a mirror?

29
00:01:52,430 --> 00:01:55,280
Ian: Sure, Ty's the guy who operates the coating
machine.

30
00:01:55,280 --> 00:01:58,170
He'd be happy to show you how that works.

31
00:01:58,170 --> 00:01:59,250
Mary: Hey Ty.

32
00:01:59,250 --> 00:02:01,930
I was told that a coating process is about
to start.

33

00:02:01,930 --> 00:02:04,520
Tyrone Wilson/Coating Chamber Technician:
Sure, we're about to start the coating soon.

34
00:02:04,520 --> 00:02:07,090
Mary: Can we tag along?

35
00:02:07,090 --> 00:02:09,769
Ty: Sure....

36
00:02:09,769 --> 00:02:13,690
What we're doing here now... we're preparing
a mirror for coating.

37
00:02:13,690 --> 00:02:19,450
Cleaning the mirror of any contaminants or
any particles that could be on the mirror.

38
00:02:19,450 --> 00:02:22,530
Mary: So Ty, what's going on here now?

39
00:02:22,530 --> 00:02:26,299
Ty: Ok now, we're putting on the shield and
the masks on the mirror because we don't want

40
00:02:26,299 --> 00:02:27,299
any
coating to get on the sides of the mirror

41
00:02:27,299 --> 00:02:29,430
and the coating cannot be beyond a certain
area on the mirror.

42
00:02:29,430 --> 00:02:32,950
Mary: So you want the gold to just be on the
surface, nothing on the sides or anything.

43
00:02:32,950 --> 00:02:33,950
Ty: Right.

44
00:02:33,950 --> 00:02:35,120
There's also a bevel on the edge of the mirror.

45
00:02:35,120 --> 00:02:37,260
We don't want any coating on the bevel either.

46
00:02:37,260 --> 00:02:40,489
Mary: How long is this going to take?

47
00:02:40,489 --> 00:02:42,700
Ty: Maybe an hour in total.

48
00:02:42,700 --> 00:02:48,980
Mary: So I understand there are no cameras
in the chamber.

49
00:02:48,980 --> 00:02:49,980
Can we see what's going on?

50
00:02:49,980 --> 00:02:52,090
Ty: We take a look inside our view port.

51
00:02:52,090 --> 00:02:57,139
We see the part rotating and the glow disperse
right now.

52
00:02:57,139 --> 00:03:05,150
Mary: So Ty, we couldn't show the actual company
specific equipment that was used to apply

53
00:03:05,150 --> 00:03:08,709
the coating but we get to see the gold coated
mirror, fresh out of the chamber!

54
00:03:08,709 --> 00:03:10,040
Ty: Yeah, it's neat.

55
00:03:10,040 --> 00:03:11,450

Look at it.

56
00:03:11,450 --> 00:03:13,739
The mirror's coated now and we're all completed.

57
00:03:13,739 --> 00:03:17,690
We're ready to ship it off to the customer
and he can begin their testing.

58
00:03:17,690 --> 00:03:21,040
Mary: Well thanks so much for guiding us through
your coating process.

59
00:03:21,040 --> 00:03:22,040
It was fascinating.

60
00:03:22,040 --> 00:03:23,879
Ty: Not a problem at all.

61
00:03:23,879 --> 00:03:28,219
Mary: So, as you can see, gold isn't just
a fashion accessory for the James Webb Space

62
00:03:28,219 --> 00:03:34,400
Telescope but a critical addition to making
the observatory work it's very best.