

1
00:00:13,789 --> 00:00:17,299
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
00:00:20,379 --> 00:00:25,059
Now the kind of metal depends upon the type of light the tele- scope is looking at.

4
00:00:25,059 --> 00:00:30,289
The James Webb Space Telescope is looking at infrared light and for that, gold is the

5
00:00:30,289 --> 00:00:31,699
ideal choice.

6
00:00:31,699 --> 00:00:36,179
To find out how the gold is put onto the mirrors of the James Webb Space Telescope, we're here

7
00:00:36,179 --> 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 unimaginably small.

13
00:00:50,229 --> 00:00:56,039
To give an example, this piece of paper is
1/1000th of an inch.

14
00:00:56,039 --> 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
00:01:15,879 --> 00:01:20,819
Ian: That amount, when it's spread out thin
enough covers the whole surface of the hexagon.

20
00:01:20,819 --> 00:01:24,079
Mary: When you apply the coating, are we talking
about a paint job?

21
00:01:24,079 --> 00:01:26,879
Ian: No, this is called vacuum deposition.

22
00:01:26,879 --> 00:01:31,189
It happens in a chamber where all the air's
been sucked out to create a vacuum and we

23
00:01:31,189 --> 00:01:33,099
vaporize the gold.

24
00:01:33,099 --> 00:01:38,459
We create a cloud of vapor and that vapor
condenses on the surface to form the film.

25

00:01:38,459 --> 00:01:41,429

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

00:02:04,519 --> 00:02:07,089

Mary: Can we tag along?

35

00:02:07,090 --> 00:02:09,769

Ty: Sure....

36

00:02:09,769 --> 00:02:13,689

What we're doing here now... we're preparing a mirror for coating.

37

00:02:13,689 --> 00:02:19,449

Cleaning the mirror of any contaminants or

any particles that could be on the mirror.

38

00:02:19,449 --> 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

00:02:32,949 --> 00:02:33,949

Ty: Right.

44

00:02:33,949 --> 00:02:35,119

There's also a bevel on the edge of the mirror.

45

00:02:35,120 --> 00:02:37,259

We don't want any coating on the bevel either.

46

00:02:37,259 --> 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

00:02:42,699 --> 00:02:48,979

Mary: So I understand there are no cameras in the chamber.

49

00:02:48,979 --> 00:02:49,979

Can we see what's going on?

50

00:02:49,979 --> 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 --> 00:03:10,039
Ty: Yeah, it's neat.

55
00:03:10,039 --> 00:03:11,449
Look at it.

56
00:03:11,449 --> 00:03:13,738
The mirror's coated now and we're all completed.

57
00:03:13,739 --> 00:03:17,689
We're ready to ship it off to the customer and he can begin their testing.

58
00:03:17,689 --> 00:03:21,039
Mary: Well thanks so much for guiding us through your coating process.

59
00:03:21,039 --> 00:03:22,039
It was fascinating.

60
00:03:22,039 --> 00:03:23,878
Ty: Not a problem at all.

61
00:03:23,878 --> 00:03:28,218
Mary: So, as you can see, gold isn't just a fashion accessory for the James Webb Space

62
00:03:28,218 --> 00:03:34,400
Telescope but a critical addition to making the observatory work it's very best.

63

00:03:34,400 --> 00:03:37,250

Thanks for joining us for this edition of
Behind the Webb.