

1
00:00:13,650 --> 00:00:18,000
Each layer on the sunshield on the Webb Telescope works a lot like your umbrella.

2
00:00:19,000 --> 00:00:23,969
It's folded up during launch, but when it comes time for the mission, each of the layers unfolds

3
00:00:23,969 --> 00:00:29,448
to become the size of a tennis court. But there are features on the layers that make the sunshield

4
00:00:29,449 --> 00:00:35,050
look like a big kite in space. To find out more about how this is done, we've come to

5
00:00:35,049 --> 00:00:39,000
Huntsville, Alabama. It's known as Rocket City but it's also home

6
00:00:39,500 --> 00:00:41,640
to the sunshield manufacturer, Mantech Corporation.

7
00:00:44,000 --> 00:00:48,448
So Matt. I was told you guys here at Mantech put features on the sunshield that make it

8
00:00:48,448 --> 00:00:49,750
look like a kite in space.

9
00:00:49,750 --> 00:00:54,009
Matt Hobbs/Manufacturing Manager: Yes we do. There are several things we add to the sunshield.

10
00:00:54,009 --> 00:00:57,878
The first thing that we start with is the light line which gives the outside shape.

11
00:00:57,878 --> 00:01:00,000
Okay this design here runs along the edge of the sunshield?

12
00:01:00,799 --> 00:01:04,390
Yes, once we go from there, we move into the

catenaries.

13

00:01:04,390 --> 00:01:05,500

What's a catenary?

14

00:01:05,500 --> 00:01:13,469

It's a metal strip basically that gives the membrane its three-dimensional shape.

15

00:01:13,469 --> 00:01:19,670

Once we add the catenaries in, we come in and we put the compliant border into the actual

16

00:01:19,670 --> 00:01:27,269

kapton material itself.... It allows the membrane to move and still keep an inner shape that

17

00:01:27,269 --> 00:01:28,939

is flat and mirror-like.

18

00:01:28,939 --> 00:01:33,500

Oh, okay. And you want that flat, mirror-like surface because?

19

00:01:33,500 --> 00:01:36,909

We want it as flat as possible because we reflect more heat that way....

20

00:01:36,909 --> 00:01:40,620

Well this is a pretty cool display but can we actually see something in action?

21

00:01:40,620 --> 00:01:41,010

Yes, we can.

22

00:01:41,010 --> 00:01:42,680

So what's going on here Matt?

23

00:01:42,680 --> 00:01:47,400

We're folding up the light line to allow us to place it on the membrane.

24

00:01:47,400 --> 00:01:48,830

So, this is made out of stainless steel?

25
00:01:48,829 --> 00:01:53,009
Yes, this is a stainless steel... It is very
light and very thin..

26
00:01:53,010 --> 00:01:55,400
How long a strip is this?

27
00:01:55,400 --> 00:01:57,380
This is about 34 feet.

28
00:01:57,379 --> 00:02:01,170
Once we put the light line on, we move in
to place two metal catenaries onto the inside

29
00:02:01,170 --> 00:02:03,810
of the membrane to give the membrane its shape.

30
00:02:03,810 --> 00:02:06,960
So why do you have like 3 people working on
the catenary?

31
00:02:06,959 --> 00:02:13,000
We can't afford any kinks or wrinkles in
the material because it does affect the shape of the membrane.

32
00:02:13,800 --> 00:02:14,500
So what do we have here?

33
00:02:15,000 --> 00:02:18,000
They're going to place the material on top
of the compliant border tool

34
00:02:18,199 --> 00:02:19,500
so that we can form a vacuum.

35
00:02:19,500 --> 00:02:21,500
So it's actually suctioning it?

36
00:02:21,500 --> 00:02:26,000
Yes, it puts a vacuum onto the film and pulls it down into the shape we're trying to achieve.

37
00:02:26,500 --> 00:02:28,500
This is one of the slowest
processes we have...

38
00:02:29,000 --> 00:02:32,000
I can imagine. But he's real precise about it.

39
00:02:32,500 --> 00:02:34,000
It takes almost 12 days.

40
00:02:34,300 --> 00:02:37,170
For each layer? Oh my goodness!

41
00:02:37,169 --> 00:02:39,000
We have a couple of these we can show you what it actually does

42
00:02:39,500 --> 00:02:41,500
to help the performance of the sunshield. Ok

43
00:02:41,680 --> 00:02:46,718
We'll place this tape down and simulate the catenaries' position. Ok

44
00:02:49,000 --> 00:02:52,468
Because basically, catenaries are stiffeners, if you will. Exactly.

45
00:02:52,620 --> 00:02:54,438
If you get any little wrinkle out here,

46
00:02:55,500 --> 00:02:56,500
Performance is degraded .

47
00:02:56,699 --> 00:03:00,998
Performance is down a lot.

48
00:03:00,998 --> 00:03:03,599
And this is just a small surface I would imagine that if you're actually looking at

49
00:03:03,800 --> 00:03:04,900
the larger scale sunshield,

50
00:03:05,000 --> 00:03:07,400
you're going to see much more

of a degradation.

51

00:03:07,800 --> 00:03:10,529

Yeah, it's much more magnified once you get into a larger scale.

52

00:03:10,528 --> 00:03:13,918

You'll recognize a couple of features that you've already seen installed on the membrane...

53

00:03:13,919 --> 00:03:18,000

so there's the light line, the catenaries, and the compliant borders.

54

00:03:18,000 --> 00:03:21,509

We use different shapes in different areas of the membrane.

55

00:03:21,509 --> 00:03:26,199

To absorb any kind of deformation that might be happening at the edges.

56

00:03:26,378 --> 00:03:26,878

Yes.

57

00:03:26,878 --> 00:03:28,649

For any part of the sunshield.

58

00:03:28,650 --> 00:03:30,010

Any part of the sunshield. Ok

59

00:03:30,009 --> 00:03:33,000

Well thanks so much Matt for showing us what you guys do to the sunshield.

60

00:03:33,199 --> 00:03:34,968

Well thank you.

61

00:03:35,000 --> 00:03:39,000

The positioning of these features vary, depending upon what layer they're working on.

62

00:03:40,000 --> 00:03:43,000

Because the five layers differ in shape and size.

63

00:03:44,000 --> 00:03:46,408

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