



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 --> 00:00:23,970

It's folded up during launch, but when it comes time for the mission, each of the layers unfolds

3
00:00:23,970 --> 00:00:29,449

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
00:00:35,050 --> 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 --> 00:00:48,449

So Matt. I was told you guys here at Mantech put features on the sunshield that make it

8
00:00:48,449 --> 00:00:49,750

look like a kite in space.

9
00:00:49,750 --> 00:00:54,010

Matt Hobbs/Manufacturing Manager: Yes we do. There are several things we add to the sunshield.

10
00:00:54,010 --> 00:00:57,879

The first thing that we start with is the light line which gives the outside shape.

11
00:00:57,879 --> 00:01:00,000

Okay this design here runs along the edge of the sunshield?

12
00:01:00,800 --> 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 --> 00:01:13,470
It's a metal strip basically that gives the membrane its three-dimensional shape.

15
00:01:13,470 --> 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 --> 00:01:27,270
kapton material itself.... It allows the membrane to move and still keep an inner shape that

17
00:01:27,270 --> 00:01:28,940
is flat and mirror-like.

18
00:01:28,940 --> 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

00:01:48,830 --> 00:01:53,010

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

00:01:57,380 --> 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

00:02:06,960 --> 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

00:02:18,200 --> 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

00:02:37,170 --> 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 --> 00:02:46,719

We'll place this tape down and simulate the catenaries' position. Ok

44

00:02:49,000 --> 00:02:52,469

Because basically, catenaries are stiffeners,
if you will. Exactly.

45

00:02:52,620 --> 00:02:54,439

If you get any little wrinkle out here,

46

00:02:55,500 --> 00:02:56,500

Performance is degraded .

47

00:02:56,700 --> 00:03:00,999

Performance is down a lot.

48

00:03:00,999 --> 00:03:03,600

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

00:03:10,529 --> 00:03:13,919

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 --> 00:03:21,510

We use different shapes in different areas of the membrane.

55

00:03:21,510 --> 00:03:26,200

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

56

00:03:26,379 --> 00:03:26,879

Yes.

57

00:03:26,879 --> 00:03:28,650

For any part of the sunshield.

58

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

Any part of the sunshield. Ok

59

00:03:30,010 --> 00:03:33,000

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

60

00:03:33,200 --> 00:03:34,969

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.