1
00:00:01,001 --> 00:00:07,513
Music

2
00:00:07,548 --> 00:00:09,120
What we're building is the MSA

3
00:00:09,155 --> 00:00:10,896
Diaphragm, and what this is, is

4
00:00:10,931 --> 00:00:12,911
it fits between the propellant

5
00:00:12,946 --> 00:00:15,151
stage of the rocket and the

6
00:00:15,186 --> 00:00:17,111
Orion capsule. This is a very

7
00:00:17,146 --> 00:00:19,295
important barrier that we need

8
00:00:19,330 --> 00:00:20,664
to have on this rocket to keep

9
00:00:20,699 --> 00:00:22,888
the hazardous coming of the

10
00:00:22,923 --> 00:00:24,640
propellant stage from getting up

11
00:00:24,675 --> 00:00:26,319
into the Orion capsule.

12
00:00:26,354 --> 00:00:27,856
The diaphragm is 100% composite

13
00:00:27,891 --> 00:00:30,951

structure, that is a fabric that

14
00:00:30,986 --> 00:00:33,566
is a carbon fiber fabric with epoxy.

15
00:00:33,601 --> 00:00:36,648
And when this is all put together

16
00:00:36,683 --> 00:00:38,560
it makes for a very strong, very

17
00:00:38,595 --> 00:00:40,175
light weight structure, and

18
00:00:40,210 --> 00:00:42,808
that’s key for space flight.

19
00:00:42,843 --> 00:00:44,520
Well this is the flight diaphragm

20
00:00:44,555 --> 00:00:45,696
that will actually fly in the

21
00:00:45,731 --> 00:00:47,575
first Orion, the EFT1 flight test.

22
00:00:47,610 --> 00:00:49,271
And with any new structure we

23
00:00:49,306 --> 00:00:50,974
have to proof test it to make

24
00:00:51,009 --> 00:00:52,231
sure it can withstand the

25
00:00:52,266 --> 00:00:53,608
structural capability of the

26
00:00:53,643 --> 00:00:55,737
flight loads, which also includes

27
00:00:55,772 --> 00:00:57,504
thermal loads, inertial loads.

28
00:00:57,539 --> 00:00:59,592
So the main design drivers for

29
00:00:59,627 --> 00:01:01,736
the diaphragm were to handle

30
00:01:01,771 --> 00:01:04,376
launch loads which can be up

31
00:01:04,411 --> 00:01:05,815
to 5 Gs, and also a pressure

32
00:01:05,850 --> 00:01:09,095
difference between the propellant

33
00:01:09,130 --> 00:01:11,640
stage and the Orion capsule.

34
00:01:11,675 --> 00:01:13,936
And so that pressure difference

35
00:01:13,971 --> 00:01:15,584
is what we are testing here today.

36
00:01:15,619 --> 00:01:17,392
When you’re dealing with composites,

37
00:01:17,427 --> 00:01:19,096
it’s a very process sensitive

38
00:01:19,131 --> 00:01:21,359

material to use, and so every time

39
00:01:21,394 --> 00:01:22,679
that you use composites you

40
00:01:22,714 --> 00:01:24,575
really need to get acceptance

41
00:01:24,610 --> 00:01:27,039
from the engineering community

42
00:01:27,074 --> 00:01:31,144
about how to fabricate and test

43
00:01:31,179 --> 00:01:33,544
the composite that you are using.

44
00:01:33,579 --> 00:01:35,704
So that has been the most

45
00:01:35,739 --> 00:01:36,952
challenging thing I think is to

46
00:01:36,987 --> 00:01:38,944
really develop a road map that the

47
00:01:38,979 --> 00:01:41,023
engineering community can get

48
00:01:41,058 --> 00:01:43,943
buy-in to and to prove out that

49
00:01:43,978 --> 00:01:46,560
the design that we are making and

50
00:01:46,595 --> 00:01:47,825
that the analysis that we are

51
00:01:47,860 --> 00:01:49,448
showing is good; can be

52
00:01:49,483 --> 00:01:50,856
substantiated by tests.

53
00:01:50,891 --> 00:01:53,936
We actually installed tri-axial

54
00:01:53,971 --> 00:01:55,384
string gauges so measures any

55
00:01:55,419 --> 00:01:58,263
strain that the article sees and

56
00:01:58,298 --> 00:02:00,191
that way the test requester can

57
00:02:00,226 --> 00:02:01,912
watch the data in real-time as we

58
00:02:01,947 --> 00:02:03,775
are applying load, and make sure

59
00:02:03,810 --> 00:02:05,807
that it’s not exceeding any kind

60
00:02:05,842 --> 00:02:07,464
of strain that he predicted.

61
00:02:07,499 --> 00:02:09,912
There is a bench mark in using

62
00:02:09,947 --> 00:02:11,544
composites in this way. It’s the

63
00:02:11,579 --> 00:02:14,152

largest structure made entirely of

64
00:02:14,187 --> 00:02:16,015
composite that NASA has endorsed

65
00:02:16,050 --> 00:02:17,535
to be put on a space craft.

66
00:02:17,570 --> 00:02:19,967
And working inter center to develop

67
00:02:20,002 --> 00:02:21,712
that, to make that a reality is a

68
00:02:21,747 --> 00:02:24,232
key milestone to how we’re going

69
00:02:24,267 --> 00:02:26,200
to be doing rockets in the future.

70
00:02:26,235 --> 00:02:27,688
And I think a lot of people are

71
00:02:27,723 --> 00:02:28,816
going to be looking back on this

72
00:02:28,851 --> 00:02:31,616
partnership for future development