1
00:00:00,000 --> 00:00:05,506
MUSIC

2
00:00:05,541 --> 00:00:08,119
Within the SLS Advanced Development

3
00:00:08,154 --> 00:00:09,974
Office, we're focusing on the 130 metric

4
00:00:10,009 --> 00:00:11,847
ton vehicle that will take us to Mars.

5
00:00:11,882 --> 00:00:13,903
Now the next thought is -- with that

6
00:00:13,938 --> 00:00:15,519
particular vehicle, what enhancements

7
00:00:15,554 --> 00:00:18,351
could be done? This particular one is a

8
00:00:18,386 --> 00:00:20,983
smaller, compact diffuser. And through

9
00:00:21,018 --> 00:00:22,719
the development and tests, we're trying

10
00:00:22,754 --> 00:00:25,023
to see if it would prove out to give us

11
00:00:25,058 --> 00:00:27,720
the performance we are looking for, but

12
00:00:27,755 --> 00:00:29,934
also a smaller, lighter-weight package.

13
00:00:29,969 --> 00:00:31,527

We are building this prototype as a

14
00:00:31,562 --> 00:00:34,247
potential add-on for the Space Launch

15
00:00:34,282 --> 00:00:37,239
System, SLS, which is going to be one of

16
00:00:37,274 --> 00:00:38,606
the largest rockets ever built.

17
00:00:38,641 --> 00:00:40,879
When you do that, there's lots of things

18
00:00:40,914 --> 00:00:42,399
you have to consider. One of the things

19
00:00:42,434 --> 00:00:44,023
that you have to consider is the fact that

20
00:00:44,058 --> 00:00:46,336
the engines that are burning to propel

21
00:00:46,371 --> 00:00:48,654
this thing into orbit requires a lot of fuel.

22
00:00:48,689 --> 00:00:51,439
So the largest tanks we have to store

23
00:00:51,474 --> 00:00:53,143
the fuel and supply it to the engines have

24
00:00:53,178 --> 00:00:55,735
to be drained very rapidly. In doing that,

25
00:00:55,770 --> 00:00:57,919
that is really no different in taking a

26
00:00:57,954 --> 00:01:00,455
water bottle and turning it upside down

27
00:01:00,490 --> 00:01:02,600
and letting the water drain out of it.

28
00:01:02,635 --> 00:01:04,630
If you just turn it upside down, it wouldn't

29
00:01:04,665 --> 00:01:06,454
come out nice and smooth. So what we

30
00:01:06,489 --> 00:01:09,030
have to do is, introduce gas, into the

31
00:01:09,065 --> 00:01:11,191
empty space to fill the void left by the

32
00:01:11,226 --> 00:01:13,831
liquid. It's called pressurization of the

33
00:01:13,866 --> 00:01:16,343
tanks. In order to do that, the gases would

34
00:01:16,378 --> 00:01:18,407
come in at a very high rate of speed,

35
00:01:18,442 --> 00:01:20,687
actually about a third of the speed of

36
00:01:20,722 --> 00:01:23,934
sound, if you just had a pipe to inject it

37
00:01:23,969 --> 00:01:25,423
into the top of the tank.

38
00:01:25,458 --> 00:01:27,743

What we want to do with the diffuser is

39
00:01:27,778 --> 00:01:29,870
we want to take that high-velocity gas

40
00:01:29,905 --> 00:01:32,326
that normally would impinge on the

41
00:01:32,361 --> 00:01:34,270
liquid surface and turn it in to a

42
00:01:34,305 --> 00:01:36,087
horizontal flow that will help prevent

43
00:01:36,122 --> 00:01:38,335
the jet from impinging on the

44
00:01:38,370 --> 00:01:40,638
liquid surface. We have a workhorse

45
00:01:40,673 --> 00:01:42,670
prototype diffuser to test out the

46
00:01:42,705 --> 00:01:44,415
concept. While we're testing the

47
00:01:44,450 --> 00:01:46,287
diffuser, we're aking lots of velocity

48
00:01:46,322 --> 00:01:48,079
measurements and gathering a lot

49
00:01:48,114 --> 00:01:50,407
of data in order to determine whether

50
00:01:50,442 --> 00:01:52,055
our computational fluid dynamics

51
00:01:52,090 --> 00:01:54,119
models accurately depicted the