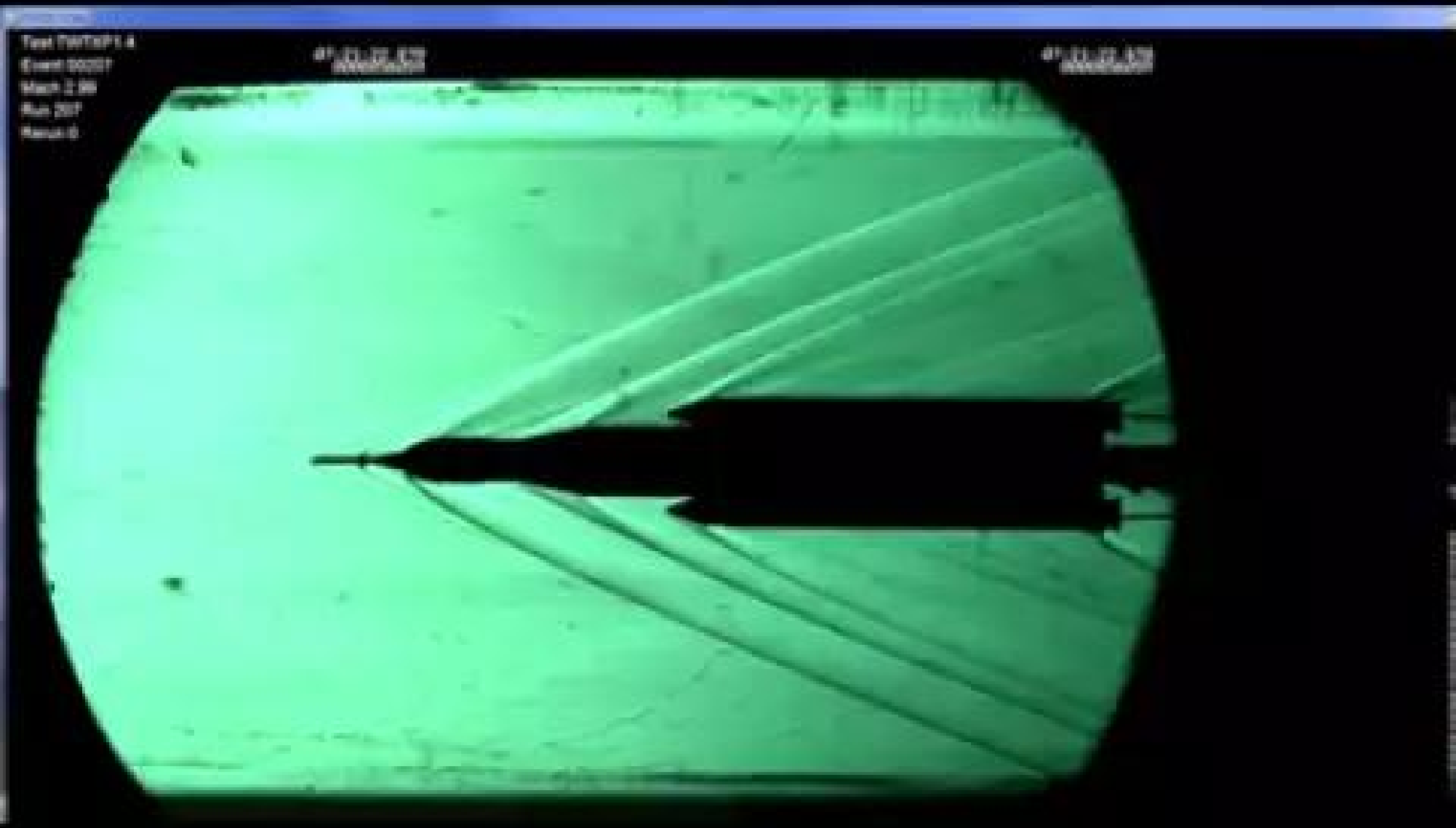

1
00:00:00,000 --> 00:00:02,682
At the start of every launch

2
00:00:02,717 --> 00:00:04,011
vehicle program, one of the

3
00:00:04,046 --> 00:00:04,827
most important things is

4
00:00:04,862 --> 00:00:06,266
aerodynamics, because you need

5
00:00:06,301 --> 00:00:07,275
to understand if you can control

6
00:00:07,310 --> 00:00:08,474
the vehicle, if it's going to

7
00:00:08,509 --> 00:00:09,930
do what you want it to do, and

8
00:00:09,965 --> 00:00:10,762
you need to know how much payload

9
00:00:10,797 --> 00:00:11,658
you're going to get to orbit.

10
00:00:11,693 --> 00:00:13,074
Those are requirements we work

11
00:00:13,109 --> 00:00:15,275
on early on and this type of

12
00:00:15,310 --> 00:00:16,106
testing is the key to

13
00:00:16,141 --> 00:00:17,243

understanding those things.

14
00:00:17,278 --> 00:00:18,139
In this particular type test,

15
00:00:18,174 --> 00:00:19,403
what we do is... we'll be

16
00:00:19,438 --> 00:00:21,866
passing air at various speeds

17
00:00:21,901 --> 00:00:23,515
or Mach numbers over the model

18
00:00:23,550 --> 00:00:24,890
and we'll be measuring the

19
00:00:24,925 --> 00:00:27,458
forces, all six degrees, so

20
00:00:27,493 --> 00:00:28,306
we'll be measuring forces

21
00:00:28,341 --> 00:00:29,699
through axes and also moments:

22
00:00:29,734 --> 00:00:33,099
the yawing, pitching, throwing

23
00:00:33,134 --> 00:00:34,371
moments for the vehicle and

24
00:00:34,406 --> 00:00:36,129
we'll be putting that into a

25
00:00:36,164 --> 00:00:37,307
database that will be used for

26
00:00:37,342 --> 00:00:38,442
guidance, navigation and control.

27
00:00:38,477 --> 00:00:40,138
This tunnel has an advantage of

28
00:00:40,173 --> 00:00:42,306
being small. Small means its

29
00:00:42,341 --> 00:00:43,634
cheap to build the models, its

30
00:00:43,669 --> 00:00:45,771
cheap to operate electrically,

31
00:00:45,806 --> 00:00:48,043
to pass the mass flow air

32
00:00:48,078 --> 00:00:49,099
through here, the energy

33
00:00:49,134 --> 00:00:50,675
consumption is low. This tunnel

34
00:00:50,710 --> 00:00:51,691
has the advantage of being

35
00:00:51,726 --> 00:00:54,435
inexpensive. In the case of this

36
00:00:54,470 --> 00:00:56,650
particular test, we've done over

37
00:00:56,685 --> 00:00:58,554
400 runs with each configuration

38
00:00:58,589 --> 00:01:00,451

and each configuration takes ten

39
00:01:00,486 --> 00:01:02,627
data points. We have lots of data

40
00:01:02,662 --> 00:01:04,890
that we pull out of each set of

41
00:01:04,925 --> 00:01:06,779
wind tunnel runs.

42
00:01:06,814 --> 00:01:08,707
Ultimately, wind tunnel testing

43
00:01:08,742 --> 00:01:10,931
is not that expensive when you

44
00:01:10,966 --> 00:01:12,786
look at the large quantity of data

45
00:01:12,821 --> 00:01:14,290
that we get out of each set of

46
00:01:14,325 --> 00:01:17,467
tests. One of the reasons we still

47
00:01:17,502 --> 00:01:18,963
use wind tunnels is that they are

48
00:01:18,998 --> 00:01:20,802
less expensive than some other

49
00:01:20,837 --> 00:01:23,170
techniques. We try to use the right

50
00:01:23,205 --> 00:01:25,394
tool with the right amount of

51
00:01:25,429 --> 00:01:27,098
resources to solve our problems.

52
00:01:27,133 --> 00:01:29,354
We've been a lot more lean in SLS

53
00:01:29,389 --> 00:01:32,298
than we were on Ares or Shuttle

54
00:01:32,333 --> 00:01:34,315
or Saturn.

55
00:01:34,350 --> 00:01:36,066
Saturn didn't have the tools that

56
00:01:36,101 --> 00:01:38,009
we have today and they didn't have

57
00:01:38,044 --> 00:01:39,498
the history that we have today. We

58
00:01:39,533 --> 00:01:41,090
leveraged a lot off of flight

59
00:01:41,125 --> 00:01:43,338
reports from Saturn and understanding

60
00:01:43,373 --> 00:01:44,778
the interaction with the atmosphere

61
00:01:44,813 --> 00:01:47,138
for the rockets included in the Apollo

62
00:01:47,173 --> 00:01:50,563
time. A lot of our benefit is through

63
00:01:50,598 --> 00:01:52,498

intelligently looking at all the

64
00:01:52,533 --> 00:01:53,826
history we've been able accumulate

65
00:01:53,861 --> 00:01:56,610
and doing things just a little more

66
00:01:56,645 --> 00:01:57,490
efficiently.

67
00:01:57,525 --> 00:01:59,554
It's exciting. I don't know anybody

68
00:01:59,589 --> 00:02:01,122
on our team that is not excited,

69
00:02:01,157 --> 00:02:03,699
that doesn't want to go do space