1
00:00:17,990 --> 00:00:15,990
this f-106 was designed in the mid-1950s

2
00:00:19,910 --> 00:00:18,000
for supersonic flight

3
00:00:22,150 --> 00:00:19,920
nasa's langley research center

4
00:00:24,150 --> 00:00:22,160
originally used the aircraft to study

5
00:00:25,590 --> 00:00:24,160
lightning by flying it directly into

6
00:00:27,750 --> 00:00:25,600
thunderstorms

7
00:00:30,230 --> 00:00:27,760
engineers are now using the plane for

8
00:00:32,709 --> 00:00:30,240
its highly swept wing to explore a

9
00:00:35,910 --> 00:00:32,719
design that incorporates a leading edge

10
00:00:38,630 --> 00:00:35,920
flap an 18-inch wide panel that runs the

11
00:00:41,430 --> 00:00:38,640
length of the wing and points downward

12
00:00:43,510 --> 00:00:41,440
wind tunnel tests with f-106 models

13
00:00:45,990 --> 00:00:43,520

indicate that installing the flap can

14
00:00:47,830 --> 00:00:46,000
increase the plane's performance by more

15
00:00:50,069 --> 00:00:47,840
than 20 percent

16
00:00:52,389 --> 00:00:50,079
265 feet

17
00:00:55,110 --> 00:00:52,399
when air passes over the wings of a

18
00:00:57,270 --> 00:00:55,120
plane small tornado-like currents called

19
00:00:59,270 --> 00:00:57,280
vortices are generated

20
00:01:02,709 --> 00:00:59,280
again look at the wingtip of the space

21
00:01:06,870 --> 00:01:04,229
touchdown

22
00:01:08,950 --> 00:01:06,880
vortices normally form along the entire

23
00:01:11,030 --> 00:01:08,960
wing and are important to aircraft

24
00:01:13,510 --> 00:01:11,040
because they generate lift

25
00:01:17,830 --> 00:01:13,520
looking at a cross-section of the f-106

26
00:01:23,670 --> 00:01:21,109
by adding a vortex flap air is channeled

27
00:01:26,149 --> 00:01:23,680
both upward and forward

28
00:01:28,390 --> 00:01:26,159
according to program manager ron smith

29
00:01:31,510 --> 00:01:28,400
no wings have ever been designed to make

30
00:01:33,910 --> 00:01:31,520
use of this vortex but we're controlling

31
00:01:35,670 --> 00:01:33,920
that vortex that tornado by putting it

32
00:01:39,670 --> 00:01:35,680
on the leading edge where we form a

33
00:01:41,990 --> 00:01:39,680
suction which pulls the airplane along

34
00:01:45,350 --> 00:01:42,000
phil brown is chief test pilot for the

35
00:01:47,749 --> 00:01:45,360
f-106 program he finds the plane much

36
00:01:48,950 --> 00:01:47,759
more responsive with the flap when doing

37
00:01:51,510 --> 00:01:48,960
the movements

38
00:01:53,350 --> 00:01:51,520

this wing design may someday translate

39
00:01:55,590 --> 00:01:53,360
into better handling qualities for

40
00:01:58,230 --> 00:01:55,600
fighter aircraft as well as improvements

41
00:02:00,469 --> 00:01:58,240
for high-speed transports

42
00:02:02,310 --> 00:02:00,479
particularly in the

43
00:02:04,230 --> 00:02:02,320
approach and landing regime where it

44
00:02:07,190 --> 00:02:04,240
will reduce drag and

45
00:02:08,869 --> 00:02:07,200
therefore require less thrust therefore

46
00:02:10,910 --> 00:02:08,879
produce less noise because the engines

47
00:02:13,830 --> 00:02:10,920
will be at lower power settings

48
00:02:16,070 --> 00:02:13,840
aerodynamic research for airplane wings

49
00:02:20,309 --> 00:02:16,080
is also the goal of another research

50
00:02:24,710 --> 00:02:22,790
using new construction techniques planes

51
00:02:27,110 --> 00:02:24,720
fly through the air easier because they

52
00:02:28,229 --> 00:02:27,120
are built with smoother more aerodynamic

53
00:02:31,190 --> 00:02:28,239
surfaces

54
00:02:34,390 --> 00:02:31,200
as a result planes burn less fuel fly

55
00:02:36,229 --> 00:02:34,400
quieter higher and at faster speeds

56
00:02:39,030 --> 00:02:36,239
in an effort to better understand the

57
00:02:41,270 --> 00:02:39,040
dynamics behind smooth airflow

58
00:02:43,830 --> 00:02:41,280
researchers coat this ultra smooth

59
00:02:50,070 --> 00:02:43,840
highly instrumented learjet wing with an

60
00:02:53,830 --> 00:02:52,949
once airborne pilots target a variety of

61
00:02:56,309 --> 00:02:53,840
allies

62
00:02:58,949 --> 00:02:56,319
and maneuvers designated by aerospace

63
00:03:01,589 --> 00:02:58,959

engineer cindy lee who sits in the back

64
00:03:02,869 --> 00:03:01,599
making real-time analysis of flow fields

65
00:03:05,190 --> 00:03:02,879
over the wing

66
00:03:07,430 --> 00:03:05,200
cindy can also tell by looking at color

67
00:03:10,309 --> 00:03:07,440
shifts in the liquid crystal whether the

68
00:03:12,630 --> 00:03:10,319
airflow is smooth or turbulent she is

69
00:03:14,470 --> 00:03:12,640
piecing together a series of calibrated

70
00:03:17,030 --> 00:03:14,480
measurements that may someday help

71
00:03:20,550 --> 00:03:17,040
aircraft manufacturers design more

72
00:03:26,390 --> 00:03:23,910
nasa's aeronautical research fine-tuning