ARMSTRONG FLIGHT RESEARCH CENTER
2022 HIGHLIGHTS

1
00:00:04,471 --> 00:00:07,774
Armstrong Flight Research Center
did amazing things this year,

2
00:00:08,008 --> 00:00:12,145
helping advance NASA's mission
to explore the unknown in air and space.

3
00:00:12,912 --> 00:00:14,948
Innovate for the benefit of humanity

4
00:00:15,281 --> 00:00:19,352
and inspire the world through discovery.

5
00:00:23,390 --> 00:00:25,692
NASA's X-57 Maxwell

6
00:00:25,725 --> 00:00:29,763
All electric aircraft reached
another milestone toward first flight.

7
00:00:30,363 --> 00:00:33,166
Lithium
ion battery packs were successfully

8
00:00:33,166 --> 00:00:35,735
installed and powered the plane's motors.

9
00:00:36,436 --> 00:00:39,873
Armstrong is advancing
all electric propulsion technology

10
00:00:40,173 --> 00:00:44,978
that will make aviation more efficient,
quiet and environmentally friendly.

11
00:00:45,979 --> 00:00:48,948
NASA and Lockheed
Martin teams made great progress

12
00:00:48,948 --> 00:00:53,353
assembling NASA's X-59 quiet
supersonic experimental aircraft.

13
00:00:53,853 --> 00:00:56,056
The crew successfully added the tail

14
00:00:56,523 --> 00:01:00,160
completed final installation of the nose,
performed

15
00:01:00,160 --> 00:01:03,930
a system check of the ejection seat
and installed the engine.

16
00:01:04,364 --> 00:01:07,834
Preparations continued for a future X-59
flight tests

17
00:01:08,068 --> 00:01:11,438
that could open the door to commercial
supersonic flights over land.

18
00:01:12,138 --> 00:01:16,409
Testing validated supersonic shockwave
imaging and measuring systems

19
00:01:16,409 --> 00:01:22,282
installed in chase aircraft that gather
critical data on the X-59’s Sonic thump.

20
00:01:23,383 --> 00:01:23,850
The chase

21
00:01:23,850 --> 00:01:26,553
aircraft also received a new life
support system

22

00:01:26,886 --> 00:01:30,690
to provide pilots with enough oxygen
during high altitude flights,

23
00:01:31,491 --> 00:01:35,228
and testing was conducted to verify
microphone stations

24
00:01:35,462 --> 00:01:38,498
that will be used to measure the thumps
on the ground.

25
00:01:39,699 --> 00:01:43,169
Advanced
Air Mobility is NASA's vision to map out

26
00:01:43,169 --> 00:01:47,407
a safe, accessible and affordable
new air transportation system.

27
00:01:47,407 --> 00:01:49,476
With the addition of new technology

28
00:01:49,476 --> 00:01:53,780
such as electric aircraft concepts
and increased automation, NASA's

29
00:01:53,780 --> 00:01:58,485
mission is researching how industry
aircraft can be integrated into the skies.

30
00:01:58,518 --> 00:02:03,022
ARMSTRONG Team members are leading
testing, simulation and information

31
00:02:03,022 --> 00:02:07,627
sharing efforts alongside researchers
from NASA's other aeronautics centers.

32
00:02:07,861 --> 00:02:10,830

Armstrong is leading an effort
to build a small scale

33
00:02:10,830 --> 00:02:14,534
version of NASA's
new hybrid electric aircraft concept.

34
00:02:14,801 --> 00:02:17,137
Four Transport category aircraft.

35
00:02:17,670 --> 00:02:21,307
Flights were conducted
to test the integrated flight Power

36
00:02:21,307 --> 00:02:25,345
and Propulsion Controls approach.

37
00:02:27,313 --> 00:02:28,081
Armstrong's

38
00:02:28,081 --> 00:02:31,951
flight loads laboratory completed
one of its biggest loads calibration

39
00:02:31,951 --> 00:02:37,123
efforts with an F/A-18E Super Hornet
from Naval Air Systems Command.

40
00:02:37,357 --> 00:02:41,928
Testing helped establish design limits
and ensure safety of flight and crew.

41
00:02:42,228 --> 00:02:46,733
87 load cases were applied to exercise
as structural response.

42
00:02:47,300 --> 00:02:50,103
NASA's
taking flight training and preparation

43
00:02:50,103 --> 00:02:53,406
to new heights at Armstrong's
simulation laboratory.

44
00:02:53,907 --> 00:02:58,411
One of a kind experimental simulations
are providing researchers, engineers

45
00:02:58,411 --> 00:03:02,582
and pilots with a safe environment
to practice test conditions.

46
00:03:03,449 --> 00:03:07,453
The first phase of NASA's new flight data
archiving and acquisition

47
00:03:07,453 --> 00:03:12,058
system was released to help engineers
record access process

48
00:03:12,325 --> 00:03:16,396
and analyze the vast amount of data
collected during flight testing.

49
00:03:16,729 --> 00:03:20,567
This phase enables better support of X-59
envelope expansion,

50
00:03:20,600 --> 00:03:29,776
flight testing.

51
00:03:29,776 --> 00:03:33,012
NASA's Armstrong's
C-20A aircraft conducted

52
00:03:33,012 --> 00:03:37,283
geological observations of California
to document the long term

53

00:03:37,283 --> 00:03:40,887
behavior of active landslides
and the San Andreas Fault.

54
00:03:41,654 --> 00:03:46,025
The science aircraft deployed to Maine
to validate soil moisture algorithms.

55
00:03:46,392 --> 00:03:49,329
And to Alaska and Canada
to study the effects

56
00:03:49,329 --> 00:03:53,132
of climate change
on Arctic and boreal ecosystems.

57
00:03:54,200 --> 00:03:55,535
A group of university

58
00:03:55,535 --> 00:04:00,073
students and mentors flew aboard
Armstrong's DC-8 aircraft to study

59
00:04:00,073 --> 00:04:04,143
air quality as part of NASA's
Student Airborne Research program.

60
00:04:04,377 --> 00:04:08,581
The DC-8 studied dangerous
engine icing conditions at high altitudes

61
00:04:08,982 --> 00:04:14,320
and deployed to Cabo Verde off the coast
of Africa to measure winds, aerosols,

62
00:04:14,320 --> 00:04:18,958
precipitation and other conditions
that influence convection.

63
00:04:19,092 --> 00:04:22,195

Armstrong's ER-2 aircraft supported NASA's

64
00:04:22,195 --> 00:04:25,531
multi-year
airborne science campaign to track U.S.

65
00:04:25,531 --> 00:04:26,966
snowstorms.

66
00:04:26,966 --> 00:04:30,570
The high altitude aircraft also studied
how convective storm

67
00:04:30,570 --> 00:04:34,874
systems affect air pollution
ecosystems and provided

68
00:04:34,874 --> 00:04:40,046
critical information on natural disasters
such as volcanoes, wildfires and drought.

69
00:04:40,680 --> 00:04:43,950
They also studied the amount of light
reflected off the moon.

70
00:04:44,550 --> 00:04:48,955
The King Air B200 science
aircraft supported NASA's campaign

71
00:04:49,188 --> 00:04:52,625
to study small ocean
whirlpools, eddies and currents

72
00:04:52,859 --> 00:04:57,664
and the role these ocean processes
play in the movement of heat, nutrients,

73
00:04:57,664 --> 00:05:00,800
oxygen and carbon from the ocean surface

74
00:05:00,800 --> 00:05:04,037
to the layers below.

75
00:05:08,641 --> 00:05:11,778
After 732 nights observing,

76
00:05:12,045 --> 00:05:14,981
NASA's SOFIA project ended September 29th,

77
00:05:15,014 --> 00:05:19,052
2022.SOFIA was a mission of discovery,

78
00:05:19,118 --> 00:05:22,422
revealing, unseen and sometimes unseeable,

79
00:05:22,422 --> 00:05:26,693
parts of our universe, including water
on the sunlit surface of the moon.

80
00:05:27,126 --> 00:05:32,332
The first type of molecule ever to form
in the universe and the intricate magnetic

81
00:05:32,332 --> 00:05:36,602
field structures involved in the formation
of stars and spiral galaxies.

82
00:05:37,003 --> 00:05:40,506
The Boeing 747SP jetliner was modified

83
00:05:40,506 --> 00:05:44,043
to carry the 38,000-pound, 100
inch telescope.

84
00:05:44,544 --> 00:05:49,849
Engineers at NASA's Ames Research Center
developed a garage door like mechanism

85

00:05:49,982 --> 00:05:53,753
that rolled up to let the telescope
observe the skies.

86
00:05:53,786 --> 00:05:58,558
By 2014, the observatory reached
its full operational capability,

87
00:05:59,125 --> 00:06:01,961
and for eight years,
SOFIA enabled astronomers

88
00:06:01,961 --> 00:06:04,797
around the world
to study the infrared universe

89
00:06:04,964 --> 00:06:08,768
and unveil impressive
cosmic events and objects invisible

90
00:06:08,768 --> 00:06:17,844
to other telescopes.

91
00:06:21,180 --> 00:06:22,682
NASA's Flight Opportunities

92
00:06:22,682 --> 00:06:27,387
program supported suborbital flight
campaigns, including parabolic flight

93
00:06:27,420 --> 00:06:32,258
testing innovations designed for a broad
range of space based capabilities,

94
00:06:32,425 --> 00:06:36,562
including 3D printing, medical care,
biotechnology,

95
00:06:36,662 --> 00:06:40,433
food and farming, power systems

and propellant gauging.

96
00:06:41,134 --> 00:06:46,639
As part of NASA's TechRise Student
Challenge, 57 student teams in grades 6

97
00:06:46,639 --> 00:06:51,077
to 12 and their teachers designed
and built space technology payloads

98
00:06:51,077 --> 00:06:55,281
to test on future suborbital rocket
or high altitude balloon flights.

99
00:06:55,615 --> 00:06:59,919
Winners of NASA's first TechLeap prize
launched their technologies

100
00:06:59,919 --> 00:07:04,090
this summer on high altitude balloon
flights testing Earth Observation

101
00:07:04,090 --> 00:07:09,429
Technologies at Stratospheric Heights,
thanks to Center Innovation Fund Awards.

102
00:07:09,796 --> 00:07:13,199
NASA's continues to create
innovative solutions to address

103
00:07:13,199 --> 00:07:16,235
some of the most pressing aerospace
challenges.

104
00:07:16,436 --> 00:07:19,939
New weather sensors were designed
to measure atmospheric pressure,

105
00:07:20,173 --> 00:07:25,211
temperature, relative humidity,

air quality and 3D wind velocities.

106
00:07:25,945 --> 00:07:28,581
And a new magnetic connector that releases

107
00:07:28,581 --> 00:07:33,286
payloads quickly and reliably was tested
and could have applications

108
00:07:33,286 --> 00:07:36,856
for aircraft, spacecraft and space
exploration.

109
00:07:37,423 --> 00:07:40,393
An early career
initiative project team is researching

110
00:07:40,393 --> 00:07:44,530
how magnets can be used to attach
and release cryogenic fuel lines

111
00:07:44,831 --> 00:07:48,901
and withstand the dust in the unforgiving
environments of the moon and Mars.

112
00:07:49,168 --> 00:07:54,273
Another early career Initiative project
team is testing highly elastic strain

113
00:07:54,273 --> 00:07:57,810
sensors to aid
in the design of supersonic parachutes

114
00:07:57,810 --> 00:08:00,980
used for Mars exploration.

115
00:08:01,013 --> 00:08:02,882
This year, Fiber Optic Sensing System

116

00:08:02,882 --> 00:08:06,786
Researchers continued Armstrong's
support of heat shield development.

117
00:08:06,819 --> 00:08:10,656
FOSS developers adapted their technology
to support NASA's

118
00:08:10,656 --> 00:08:14,126
demonstration of an inflatable heat
shield technology

119
00:08:14,360 --> 00:08:18,097
that could help land heavy payload
cheaply on Mars.

120
00:08:18,331 --> 00:08:23,202
In 2013 and 2014, NASA's Armstrong's
flight loads

121
00:08:23,202 --> 00:08:28,074
laboratory conducted structural tests
on the donut shaped inflatable device

122
00:08:28,307 --> 00:08:31,644
designed to more effectively
slow down the spacecraft

123
00:08:31,811 --> 00:08:35,581
upon atmospheric reentry to earth
or other planets.

124
00:08:35,915 --> 00:08:39,252
November's return from orbit
demonstration was the next step

125
00:08:39,452 --> 00:08:49,028
in the technology's development.

126
00:08:51,631 --> 00:08:52,598

All eyes were

127
00:08:52,598 --> 00:08:56,235
on Artemis one in November.

128
00:08:56,502 --> 00:08:59,205
The first launch of NASA's
mega moon rocket,

129
00:08:59,605 --> 00:09:03,209
the Space Launch System,
and the Orion spacecraft.

130
00:09:03,743 --> 00:09:06,879
As NASA builds
a long term presence on the moon.

131
00:09:07,246 --> 00:09:10,917
Previously, NASA's
Armstrong played key roles in the Orion

132
00:09:10,917 --> 00:09:14,720
launch Abort System
Developmental test, Orion parachute tests,

133
00:09:15,388 --> 00:09:17,890
autonomous flight control system testing,

134
00:09:18,357 --> 00:09:22,662
and the spacecraft Launch Abort System
Demonstration this year.

135
00:09:22,695 --> 00:09:27,300
Armstrong's Global Hawk unmanned aircraft
collected rockets systems health data

136
00:09:27,533 --> 00:09:31,370
during the Artemis One launch
and in preparation for Artemis

137
00:09:31,370 --> 00:09:35,641
two engineers are supporting development
and integration of a system

138
00:09:35,641 --> 00:09:46,652
to collect heat shield data
during launch, NASA's Armstrong

139
00:09:46,652 --> 00:09:51,157
Innovators, pilots and mission support
teams attended events geared towards

140
00:09:51,157 --> 00:09:53,626
inspiring the next generation
of innovators.

141
00:09:54,126 --> 00:09:57,797
The center participated with exhibits
and hands on demonstrations,

142
00:09:58,130 --> 00:10:03,002
showcasing aviation inspired technology
and the latest in NASA's

143
00:10:03,002 --> 00:10:07,406
aeronautics, research, space,
exploration, science and more.

144
00:10:07,707 --> 00:10:11,477
That's Armstrong
Flight Research Center's 2022 Highlights.