
NASA

1
00:00:01,201 --> 00:00:02,302
[Mission Control]: Ten...

2
00:00:02,302 --> 00:00:03,770
nine... eight...

3
00:00:03,770 --> 00:00:07,007
ignition sequence start,
engines on, five...

4
00:00:07,007 --> 00:00:09,009
four... three...

5
00:00:09,009 --> 00:00:10,777
two... one...

6
00:00:10,780 --> 00:00:14,240
all engines running...

7
00:00:14,240 --> 00:00:15,620
[Music]

8
00:00:15,620 --> 00:00:17,217
>>When you think of NASA,
you probably think

9
00:00:17,217 --> 00:00:23,056
of space exploration, which is
a huge part of what NASA does.

10
00:00:23,056 --> 00:00:25,125
But, what you might not
know is that aeronautics,

11
00:00:25,125 --> 00:00:28,061
the science of flight, is
also an important piece

12

00:00:28,061 --> 00:00:30,097
of NASA's directive.

13
00:00:30,097 --> 00:00:32,599
It's even in our name
- National Aeronautics

14
00:00:32,599 --> 00:00:34,368
and Space Administration.

15
00:00:34,368 --> 00:00:37,980
In fact, NASA was conducting
flight research long before we

16
00:00:37,980 --> 00:00:40,200
put a man on the moon.

17
00:00:40,207 --> 00:00:41,241
NASA has flown some

18
00:00:41,241 --> 00:00:44,311
of the world's most advanced
research technologies leading

19
00:00:44,311 --> 00:00:45,712
to innovations in safety...

20
00:00:45,712 --> 00:00:46,880
[Aircraft Computer]: Pull up!

21
00:00:46,880 --> 00:00:51,051
>>...speed, and efficiency.

22
00:00:51,051 --> 00:00:53,954
We here at NASA's Armstrong
Flight Research Center have been

23
00:00:53,954 --> 00:00:56,123
on the cutting edge of

aeronautical development

24
00:00:56,123 --> 00:00:58,900
in pursuit of our goal
to advance technology

25
00:00:58,900 --> 00:01:00,820
and science through flight.

26
00:01:00,827 --> 00:01:06,427
[Aircraft flying] [Music]

27
00:01:29,056 --> 00:01:30,724
Our story began in the 1940's

28
00:01:30,724 --> 00:01:33,460
when the National Advisory
Committee for Aeronautics,

29
00:01:33,460 --> 00:01:35,028
NASA's predecessor agency,

30
00:01:35,028 --> 00:01:37,100
teamed up with the
U.S. Air Force

31
00:01:37,100 --> 00:01:41,635
to fly the X-1 rocket plane
in pursuit of one question:

32
00:01:41,635 --> 00:01:44,371
could an aircraft and
its pilot fly faster

33
00:01:44,371 --> 00:01:47,074
than the speed of sound?

34
00:01:47,074 --> 00:01:50,577
[1940s Film Narrator]: A B-29

will take the XS-1 aloft,

35
00:01:50,577 --> 00:01:54,548
and launch her at an
altitude of about 35,000 feet.

36
00:01:54,548 --> 00:01:58,560
The really big moment...through
the sound barrier!

37
00:01:58,560 --> 00:01:59,553
[Sonic boom]

38
00:01:59,553 --> 00:02:03,156
The first time ever
in level flight.

39
00:02:03,156 --> 00:02:07,160
>>They successfully answered
that question in 1947.

40
00:02:07,160 --> 00:02:09,029
New X-planes soon followed,

41
00:02:09,029 --> 00:02:12,699
and throughout the 1950s
these aircraft made headlines

42
00:02:12,699 --> 00:02:17,404
with ever-higher speed
and altitude records.

43
00:02:17,404 --> 00:02:20,307
The fastest and most remarkable
of all the rocket planes,

44
00:02:20,307 --> 00:02:25,779
the X-15, was flown
from 1959 to 1968.

45
00:02:25,779 --> 00:02:27,814
There was simply
nothing else like it.

46
00:02:27,814 --> 00:02:31,752
Pilots took it to speeds of
over 4,500 miles per hour

47
00:02:31,752 --> 00:02:34,488
and some flights
reached altitudes so high

48
00:02:34,488 --> 00:02:36,990
that they passed
briefly into space.

49
00:02:36,990 --> 00:02:40,800
Many of NASA's X-15 test pilots
actually earned their astronaut

50
00:02:40,800 --> 00:02:42,260
wings here.

51
00:02:42,262 --> 00:02:45,165
One of the pilots who did not
was a young man named Neil

52
00:02:45,165 --> 00:02:49,269
Armstrong; however, his
experiences flying the X-15,

53
00:02:49,269 --> 00:02:51,605
as well as the Lunar
Landing Research Vehicle,

54
00:02:51,605 --> 00:02:54,480
provided him the skills he
needed on later missions

55

00:02:54,480 --> 00:02:57,000
where he, of course, did
end up earning his wings.

56
00:02:57,010 --> 00:03:00,680
[Neil Armstrong]: That's
one small step for man...

57
00:03:00,680 --> 00:03:04,484
>>Research aircraft like the
X-15 provided valuable information

58
00:03:04,484 --> 00:03:07,187
about the human body in
spaceflight, and were critical

59
00:03:07,187 --> 00:03:11,024
in the design of future
aircraft and spacecraft.

60
00:03:11,024 --> 00:03:13,026
[Music]

61
00:03:13,026 --> 00:03:15,062
[Radio Chatter]

62
00:03:15,062 --> 00:03:17,097
[Aircraft flying]

63
00:03:17,097 --> 00:03:19,966
The Armstrong Flight Research
Center introduced the world

64
00:03:19,966 --> 00:03:22,736
to wingless experimental
aircraft.

65
00:03:22,736 --> 00:03:25,472
Flown in the 1960s and 1970s,

66
00:03:25,472 --> 00:03:27,574
these vehicles made
a great contribution

67
00:03:27,574 --> 00:03:29,576
to the future of space flight.

68
00:03:29,576 --> 00:03:33,547
In 1977, we applied knowledge
gained from the flights

69
00:03:33,547 --> 00:03:36,083
of these lifting bodies when
we conducted the Approach

70
00:03:36,083 --> 00:03:38,760
and Landing Tests, a
milestone in the development

71
00:03:38,760 --> 00:03:41,154
of the Space Shuttle Program.

72
00:03:41,154 --> 00:03:45,292
[Radio]: Down!

73
00:03:45,292 --> 00:03:47,594
>>The prototype orbiter
Enterprise was used

74
00:03:47,594 --> 00:03:50,097
to verify the flying
characteristics of the shuttles

75
00:03:50,097 --> 00:03:54,267
and to test the systems before
they ever went into space.

76
00:03:54,267 --> 00:03:57,680
These risky flights, five

in all, were a success,

77
00:03:57,680 --> 00:04:00,273
and the Space Shuttle
program would go on to be one

78
00:04:00,273 --> 00:04:02,476
of NASA's most important
achievements

79
00:04:02,476 --> 00:04:06,179
in space travel and exploration.

80
00:04:06,179 --> 00:04:09,783
During the life of the program
there were 59 successful shuttle

81
00:04:09,783 --> 00:04:14,788
landings here, including
those of the Enterprise.

82
00:04:16,723 --> 00:04:19,893
Today, wingless lifting
bodies are making a come back

83
00:04:19,893 --> 00:04:24,898
as Sierra Nevada brings its
Dream Chaser to flight status.

84
00:04:26,099 --> 00:04:29,369
Supporting the shuttle program
was only one part of our work

85
00:04:29,369 --> 00:04:32,439
in the post-Apollo years.

86
00:04:32,439 --> 00:04:35,375
Have you ever heard
the term "Fly By Wire"?

87
00:04:35,375 --> 00:04:37,978
It describes the use of
electronics and computers

88
00:04:37,978 --> 00:04:40,313
to control an aircraft.

89
00:04:40,313 --> 00:04:43,316
Taking the place of
mechanical or hydraulic systems,

90
00:04:43,316 --> 00:04:45,852
flyby- wire technology
was first tested

91
00:04:45,852 --> 00:04:50,190
on a modified F-8
aircraft in 1972.

92
00:04:50,190 --> 00:04:56,163
The flights were dangerous, but
they revolutionized aviation.

93
00:04:56,163 --> 00:04:58,640
A fly-by-wire production
system first appeared

94
00:04:58,640 --> 00:05:01,800
on the Air Force's
F-16 and is now common

95
00:05:01,801 --> 00:05:05,272
on all new commercial airliners,
most new business jets,

96
00:05:05,272 --> 00:05:09,643
and even in family automobiles
as drive-by-wire systems.

97

00:05:09,643 --> 00:05:14,047
ABS brakes, cruise
control, accelerators -

98
00:05:14,047 --> 00:05:16,950
even steer-by-wire -
are technologies derived

99
00:05:16,950 --> 00:05:19,085
from research done
at NASA Armstrong...

100
00:05:19,085 --> 00:05:22,520
and all are now part
of our daily lives.

101
00:05:22,522 --> 00:05:26,026
[Music]

102
00:05:26,026 --> 00:05:31,040
[Aircraft taking off]

103
00:05:31,040 --> 00:05:33,733
Another example of aeronautical
innovation NASA conducted

104
00:05:33,733 --> 00:05:36,369
at Armstrong is winglets,
which were tested

105
00:05:36,369 --> 00:05:40,880
and validated here
in the 1970s and 80s.

106
00:05:40,880 --> 00:05:42,940
By reducing aerodynamic drag,

107
00:05:42,943 --> 00:05:46,446
winglets improve aircraft fuel
efficiency; they are now used

108
00:05:46,446 --> 00:05:50,450
on all types of aircraft.

109
00:05:50,450 --> 00:05:54,360
We also conducted tests in
the mid '70's to find ways

110
00:05:54,360 --> 00:05:56,420
to reduce drag on
long-haul trucks

111
00:05:56,423 --> 00:05:58,500
with aerodynamic fairings,

112
00:05:58,500 --> 00:06:03,420
the results of which have
also been widely adopted.

113
00:06:03,430 --> 00:06:08,435
[Truck driving]

114
00:06:10,070 --> 00:06:14,107
As far back as the 1960s's,
NASA Armstrong pioneered the use

115
00:06:14,107 --> 00:06:16,080
of a Ground Control
Station from which

116
00:06:16,080 --> 00:06:20,213
to fly Unmanned Aerial
Vehicles, known as UAV's.

117
00:06:20,213 --> 00:06:23,183
Becoming increasingly common
today, these aircraft are used

118
00:06:23,200 --> 00:06:25,660

by the center to develop
technology that allows them

119
00:06:25,660 --> 00:06:27,020
to see one another

120
00:06:27,020 --> 00:06:30,657
and automatically take evasive
action to avoid collisions.

121
00:06:30,657 --> 00:06:33,693
Known as Automatic Dependent
Surveillance Broadcast,

122
00:06:33,693 --> 00:06:36,930
or ADS-B, this tracking
technology is something

123
00:06:36,930 --> 00:06:40,500
that all aircraft operating
in US airspace must adopt

124
00:06:40,500 --> 00:06:45,505
by January 2020 in order to
comply with FAA regulations.

125
00:06:46,373 --> 00:06:51,678
Between 2007 and 2009 one of
our UAV's, known as Ikhana,

126
00:06:51,678 --> 00:06:54,881
flew over thick smoke and
haze to record hot spots

127
00:06:54,881 --> 00:06:57,951
and the progression of
wildfires in California.

128
00:06:57,951 --> 00:07:00,787
Data from the aircraft sensors

was downlinked and overlaid

129
00:07:00,787 --> 00:07:03,923
on Google Earth maps, then
transmitted in near-real time

130
00:07:03,923 --> 00:07:06,926
to the Interagency Fire Center,
where it was made available

131
00:07:06,926 --> 00:07:08,800
to fire incident
commanders to assist them

132
00:07:08,800 --> 00:07:11,331
in allocating their
fire-fighting resources.

133
00:07:11,331 --> 00:07:15,402
The effects were dramatic
enhancements for the fire crews.

134
00:07:15,402 --> 00:07:19,472
Armstrong also operates two
early model Global Hawks,

135
00:07:19,472 --> 00:07:21,675
another type of UAV.

136
00:07:21,675 --> 00:07:25,078
These aircraft can fly long
distances, remain airborne

137
00:07:25,078 --> 00:07:28,320
for up to 32 hours, and
can carry large payloads

138
00:07:28,320 --> 00:07:30,340
of instruments into
areas, such as hurricanes,

139
00:07:30,340 --> 00:07:35,360
that are too dangerous
for scientists to fly in.

140
00:07:35,360 --> 00:07:37,057
[Music]

141
00:07:37,057 --> 00:07:39,359
NASA has long been involved
in Earth Science research

142
00:07:39,359 --> 00:07:41,528
and the Armstrong Flight
Research Center

143
00:07:41,528 --> 00:07:45,598
operates a variety of aircraft
to support this directive,

144
00:07:45,598 --> 00:07:49,636
including two ER-2's,
a DC-8, and a C-20,

145
00:07:49,636 --> 00:07:52,640
as well as the large UAVs.

146
00:07:52,640 --> 00:07:55,540
These aircraft are equipped with
instruments that researchers use

147
00:07:55,542 --> 00:07:58,420
to obtain measurements of
environmental phenomena,

148
00:07:58,420 --> 00:08:00,880
such as the thickness
of ice sheets,

149

00:08:00,880 --> 00:08:04,784
precipitation, and air quality.

150
00:08:04,784 --> 00:08:06,786
Measurements and readings
are often combined

151
00:08:06,786 --> 00:08:09,556
with global satellite
observations and ground sampling

152
00:08:09,556 --> 00:08:13,126
to better understand these
environmental conditions.

153
00:08:13,126 --> 00:08:15,200
[Music]

154
00:08:15,200 --> 00:08:17,560
In the 1990s and early 2000s,

155
00:08:17,564 --> 00:08:20,340
Armstrong tested hybrid
propulsion technology

156
00:08:20,340 --> 00:08:23,520
in the hopes of making
aviation greener.

157
00:08:23,520 --> 00:08:26,606
Other NASA aeronautical research
has improved fuel efficiency,

158
00:08:26,606 --> 00:08:30,076
lowered noise levels, and
reduced harmful emissions,

159
00:08:30,076 --> 00:08:32,579
but much more can be
done in these areas.

160
00:08:32,579 --> 00:08:35,582
That's why NASA implemented
the Environmentally Responsible

161
00:08:35,582 --> 00:08:39,386
Aviation Project to explore
and document the feasibility,

162
00:08:39,386 --> 00:08:41,060
benefits, and technical risks

163
00:08:41,060 --> 00:08:42,720
that will further
reduce the impact

164
00:08:42,722 --> 00:08:45,200
of aviation on the environment.

165
00:08:45,200 --> 00:08:49,520
The goal is to reduce aircraft
fuel consumption, emissions

166
00:08:49,529 --> 00:08:51,540
and noise simultaneously...

167
00:08:51,540 --> 00:08:53,433
a much more difficult
challenge than working

168
00:08:53,433 --> 00:08:55,468
to reduce them individually.

169
00:08:55,468 --> 00:08:58,805
As part of this project, NASA
Armstrong performed ground tests

170
00:08:58,805 --> 00:09:00,840
with its DC-8, measuring

emissions

171
00:09:00,840 --> 00:09:02,942
and fuel performance
of biofuels.

172
00:09:02,942 --> 00:09:06,079
Results indicated as much
as a 50 percent reduction

173
00:09:06,079 --> 00:09:08,715
in emissions at takeoff
thrust- a difference

174
00:09:08,715 --> 00:09:11,051
which could significantly
improve the air quality

175
00:09:11,051 --> 00:09:13,520
around airports.

176
00:09:13,520 --> 00:09:15,288
And we are currently working on

177
00:09:15,288 --> 00:09:17,590
an Adaptive Compliant
Trailing Edge flight experiment

178
00:09:17,590 --> 00:09:20,900
that will demonstrate a
single, non-rigid wing flap

179
00:09:20,900 --> 00:09:22,720
that can be flexed
in different ways;

180
00:09:22,729 --> 00:09:27,700
this leads to more efficient
control methods when airborne.

181
00:09:27,700 --> 00:09:31,070
Flying from 2007 to
2013 at Armstrong,

182
00:09:31,070 --> 00:09:34,741
the X-48 subscale Hybrid
Wing Body was another program

183
00:09:34,741 --> 00:09:38,445
in NASA's Environmentally
Responsible Aviation portfolio.

184
00:09:38,445 --> 00:09:42,282
NASA, Boeing Phantom Works,
Cranfield Aerospace of the U.K.,

185
00:09:42,282 --> 00:09:44,250
and the Air Force
Research Laboratory,

186
00:09:44,250 --> 00:09:46,986
partnered to study the
structural, aerodynamic,

187
00:09:46,986 --> 00:09:49,522
and operational advantages
of the Hybrid model,

188
00:09:49,522 --> 00:09:52,992
sometimes called a
Blended Wing Body.

189
00:09:52,992 --> 00:09:55,662
The concept is a cross
between a conventional aircraft

190
00:09:55,662 --> 00:09:57,130
and a flying wing.

191

00:09:57,130 --> 00:09:58,840
The design has the
potential to yield

192
00:09:58,840 --> 00:10:01,134
up to thirty percent
better fuel economy

193
00:10:01,134 --> 00:10:04,504
than traditional aircraft
due to its unique shape.

194
00:10:04,504 --> 00:10:09,209
[Music]

195
00:10:09,209 --> 00:10:11,920
The Stratospheric Observatory
for Infrared Astronomy,

196
00:10:11,920 --> 00:10:14,980
known as SOFIA, is a
partnership between NASA

197
00:10:14,981 --> 00:10:18,184
and the German Aerospace
Center, DLR.

198
00:10:18,184 --> 00:10:19,860
The flying observatory consists

199
00:10:19,860 --> 00:10:24,420
of a highly modified 747SP
former airliner carrying a

200
00:10:24,424 --> 00:10:28,995
17-metric ton, German-built,
infrared telescope.

201
00:10:28,995 --> 00:10:33,733
Missions are flown at altitudes

between 39,000 and 45,000 feet,

202
00:10:33,733 --> 00:10:36,102
putting the telescope
above 99 percent

203
00:10:36,102 --> 00:10:37,904
of the Earth's water vapor.

204
00:10:37,904 --> 00:10:40,340
Being able to reposition
the telescope anywhere

205
00:10:40,340 --> 00:10:44,143
on Earth is a unique capability:
not long ago, for example,

206
00:10:44,143 --> 00:10:46,613
it enabled astronomers
to chase Pluto's shadow

207
00:10:46,620 --> 00:10:48,381
as it moved across the Earth,

208
00:10:48,381 --> 00:10:50,482
and SOFIA was able to
study the dwarf planet

209
00:10:50,483 --> 00:10:54,721
for a much longer period of time
than a stationary observatory.

210
00:10:54,721 --> 00:10:57,991
The aircraft, flown out of
Armstrong's Palmdale hangar,

211
00:10:57,991 --> 00:11:00,360
is making infrared
astronomy missions available

212
00:11:00,360 --> 00:11:02,529
to the international
science community.

213
00:11:02,529 --> 00:11:07,534
[Aircraft taking off]

214
00:11:12,005 --> 00:11:14,307
[Music]

215
00:11:14,307 --> 00:11:17,443
Armstrong Flight Research Center
flies modified high-performance

216
00:11:17,443 --> 00:11:19,479
aircraft as test
beds for a variety

217
00:11:19,479 --> 00:11:21,481
of flight research experiments.

218
00:11:21,481 --> 00:11:23,616
In the 90s we used F-18s to test

219
00:11:23,616 --> 00:11:25,718
and demonstrate thrust
vectoring,

220
00:11:25,718 --> 00:11:30,723
which is a standard
feature on today's F-22.

221
00:11:32,220 --> 00:11:34,940
We used F-15s for a
series of experiments

222
00:11:34,949 --> 00:11:37,160
on intelligent flight
control systems,

223
00:11:37,163 --> 00:11:40,700
a variation of which
appears on the F-35.

224
00:11:40,700 --> 00:11:42,569
This system makes it
possible to recover

225
00:11:42,569 --> 00:11:45,004
from what otherwise would
be catastrophic failure

226
00:11:45,004 --> 00:11:49,008
of equipment, systems, or even
portions of the aircraft itself.

227
00:11:49,008 --> 00:11:50,343
[Music] [Aircraft flying]

228
00:11:50,343 --> 00:11:53,379
[Aircraft Computer]: Pull up!
Pull up!

229
00:11:53,379 --> 00:11:55,782
Altitude!

230
00:11:55,782 --> 00:11:59,118
>>Long involved in aviation
safety, NASA Armstrong,

231
00:11:59,118 --> 00:12:00,853
working with the US Air Force,

232
00:12:00,853 --> 00:12:03,823
has been developing automatic
collision avoidance technologies

233
00:12:03,823 --> 00:12:06,159

for over 20 years.

234
00:12:06,159 --> 00:12:07,093
The most recent version

235
00:12:07,093 --> 00:12:10,330
of Automatic Collision
Avoidance Technology, or ACAT,

236
00:12:10,330 --> 00:12:13,440
flew on an Air Force F-16D.

237
00:12:13,440 --> 00:12:16,436
This integrated hardware and
software system is designed

238
00:12:16,436 --> 00:12:19,005
to detect and avoid
ground collisions.

239
00:12:19,005 --> 00:12:21,007
[Aircraft flying]

240
00:12:21,007 --> 00:12:23,307
[Radio chatter]

241
00:12:24,043 --> 00:12:25,445
In an effort to introduce
this development

242
00:12:25,445 --> 00:12:27,080
into general aviation,

243
00:12:27,080 --> 00:12:31,551
researchers at Armstrong have
been using a small UAV, DROID,

244
00:12:31,551 --> 00:12:32,752
to demonstrate the ability

245
00:12:32,752 --> 00:12:35,722
to implement it using common
cell phone technology,

246
00:12:35,722 --> 00:12:39,525
which provides for low cost
and high accessibility.

247
00:12:39,525 --> 00:12:42,028
[Aircraft flying]

248
00:12:42,028 --> 00:12:44,660
[Radio chatter]

249
00:12:44,660 --> 00:12:45,980
From its very inception,

250
00:12:45,980 --> 00:12:50,100
NASA Armstrong has
explored supersonic flight.

251
00:12:50,103 --> 00:12:51,804
Today, the goal in this field is

252
00:12:51,804 --> 00:12:54,940
to enable supersonic
transportation over land.

253
00:12:54,940 --> 00:12:56,060
[Sonic boom]

254
00:12:56,060 --> 00:12:56,976
Because planes traveling

255
00:12:56,976 --> 00:12:59,512
at supersonic speeds
cause sonic booms...

256
00:12:59,512 --> 00:13:02,081
[Sonic boom]

257
00:13:02,081 --> 00:13:03,716
...which are potentially
disruptive to people

258
00:13:03,716 --> 00:13:06,719
and structures on the ground,
our researchers are working

259
00:13:06,719 --> 00:13:09,522
to minimize the booms'
impact at ground level.

260
00:13:09,522 --> 00:13:13,493
[Music]

261
00:13:13,493 --> 00:13:16,129
We conduct tests of
future supersonic wings

262
00:13:16,129 --> 00:13:19,565
and aerodynamic designs, as well
as research into the effects

263
00:13:19,565 --> 00:13:23,636
of sonic booms on structures and
people, in pursuit of our goal

264
00:13:23,636 --> 00:13:27,240
to one day achieve quiet
or low-level sonic booms.

265
00:13:27,240 --> 00:13:29,475
[Sonic boom]

266
00:13:29,475 --> 00:13:31,778
Armstrong continues

to apply flight research

267
00:13:31,778 --> 00:13:33,680
and test techniques to
new launch systems...

268
00:13:33,680 --> 00:13:34,920
[Radio]: Launch, launch, launch!

269
00:13:34,920 --> 00:13:37,180
>>harboring innovative ideas
that are now under study

270
00:13:37,183 --> 00:13:39,018
and will rapidly be
brought to flight.

271
00:13:39,018 --> 00:13:41,020
[Rocket liftoff]

272
00:13:41,020 --> 00:13:43,423
[Music]

273
00:13:43,423 --> 00:13:45,058
[Crowd] Five, four,
three, two, one...

274
00:13:45,058 --> 00:13:48,327
>>NASA Armstrong also manages
the agency's Flight Opportunities

275
00:13:48,327 --> 00:13:50,863
Program, created to
provide opportunities

276
00:13:50,863 --> 00:13:53,666
for space technologies to be
demonstrated and validated

277

00:13:53,666 --> 00:13:56,106
in relevant environments.

278
00:13:56,106 --> 00:13:59,400
In 2011, seven companies
were selected to integrate

279
00:13:59,405 --> 00:14:03,109
and fly a variety of technology
payloads at reduced costs,

280
00:14:03,109 --> 00:14:05,720
a central goal of the program.

281
00:14:05,720 --> 00:14:07,840
These payloads, flown
on reusable,

282
00:14:07,847 --> 00:14:10,583
commercial vehicles near
the boundary of space,

283
00:14:10,583 --> 00:14:14,020
are helping to pave the way
for future space exploration.

284
00:14:14,020 --> 00:14:19,025
[Rockets] [Music]

285
00:14:20,226 --> 00:14:23,396
NASA has shifted its
approach to space exploration.

286
00:14:23,396 --> 00:14:26,332
The agency is partnering with
a variety of private companies

287
00:14:26,332 --> 00:14:29,302
to develop cost effective
crew and cargo transportation

288
00:14:29,302 --> 00:14:31,767
to Low Earth Orbit, known as LEO.

289
00:14:31,767 --> 00:14:34,780
Sierra Nevada Corporation's
Dream Chaser Space System,

290
00:14:34,780 --> 00:14:36,576
which has already done
flight-testing here

291
00:14:36,576 --> 00:14:39,879
at Armstrong, is
one example of this.

292
00:14:39,879 --> 00:14:41,914
With increased reliance
on private industry

293
00:14:41,914 --> 00:14:45,084
for LEO transportation,
NASA will be able to focus

294
00:14:45,084 --> 00:14:46,986
on deep space exploration,

295
00:14:46,986 --> 00:14:49,260
taking us into outer
space farther

296
00:14:49,260 --> 00:14:51,520
than we have ever been before.

297
00:14:51,520 --> 00:14:59,040
[Music] [Radio chatter]

298
00:14:59,040 --> 00:15:06,139
[Music]

299
00:15:06,139 --> 00:15:08,541
So, as you can see, there
is a lot more to NASA

300
00:15:08,541 --> 00:15:10,643
than space exploration.

301
00:15:10,643 --> 00:15:13,946
NASA works everyday to solve
the challenges that still exist

302
00:15:13,946 --> 00:15:16,983
in our nation's air
transportation system.

303
00:15:16,983 --> 00:15:20,153
With green aviation, the
agency is helping create safer,

304
00:15:20,153 --> 00:15:22,522
cleaner, and more
effective travel for everyone

305
00:15:22,522 --> 00:15:25,100
through fuel-efficient flight
planning, and the reduction

306
00:15:25,100 --> 00:15:28,720
of aircraft fuel consumption,
emissions, and noise.

307
00:15:28,728 --> 00:15:31,364
Here at NASA's Armstrong
Flight Research Center,

308
00:15:31,364 --> 00:15:33,166
we are conducting an
unprecedented array

309
00:15:33,166 --> 00:15:35,368
of science missions that
will seek new knowledge

310
00:15:35,368 --> 00:15:39,505
and understanding of Earth, the
solar system, and the universe.

311
00:15:39,505 --> 00:15:45,945
[Music] [Radio chatter]

312
00:15:45,945 --> 00:15:49,315
>>At Armstrong, we are
pioneers, taking the first step

313
00:15:49,315 --> 00:15:51,651
in proving new flight
technologies,

314
00:15:51,651 --> 00:15:54,554
which have practical
implications here on our planet