
RESEARCH & TECHNOLOGY

1
00:00:27,029 --> 00:00:24,390
the ability to

2
00:00:28,390 --> 00:00:27,039
take off in a short distance and land in

3
00:00:31,349 --> 00:00:28,400
a short distance

4
00:00:33,670 --> 00:00:31,359
or vertically is something aeronautical

5
00:00:36,870 --> 00:00:33,680
engineers have strived towards

6
00:00:37,190 --> 00:00:36,880
since world war two early attempts at

7
00:00:41,030 --> 00:00:37,200
this

8
00:00:45,910 --> 00:00:41,040
include the autogyro the helicopter

9
00:00:48,869 --> 00:00:45,920
the vertiget and other research aircraft

10
00:00:50,150 --> 00:00:48,879
today we have machines like the v-22

11
00:00:53,270 --> 00:00:50,160
osprey

12
00:00:56,150 --> 00:00:53,280
a tilt rotor aircraft

13
00:00:56,830 --> 00:00:56,160

the quiet short-haul research aircraft

14
00:01:05,429 --> 00:00:56,840
or

15
00:01:06,710 --> 00:01:05,439
which are in flight testing programs at

16
00:01:09,670 --> 00:01:06,720
other nasa centers

17
00:01:11,990 --> 00:01:09,680
in the united states there is one

18
00:01:12,469 --> 00:01:12,000
aircraft currently being used that is a

19
00:01:15,350 --> 00:01:12,479
true

20
00:01:16,469 --> 00:01:15,360
stovl type aircraft it is the british

21
00:01:19,429 --> 00:01:16,479
made harrier

22
00:01:20,469 --> 00:01:19,439
jump jet this plane is manufactured in

23
00:01:23,270 --> 00:01:20,479
the united states

24
00:01:25,270 --> 00:01:23,280
by mcdonnell douglas under license as

25
00:01:29,429 --> 00:01:25,280
the av-8a

26
00:01:31,670 --> 00:01:29,439
and av8b here at lewis research center

27
00:01:32,469 --> 00:01:31,680
we are currently testing scale models of

28
00:01:35,590 --> 00:01:32,479
advanced

29
00:01:36,550 --> 00:01:35,600
supersonic stoval concepts hot gas

30
00:01:38,950 --> 00:01:36,560
ingestion

31
00:01:40,230 --> 00:01:38,960
and controls and propulsion system

32
00:01:42,870 --> 00:01:40,240
technology

33
00:01:44,950 --> 00:01:42,880
lewis's main role then is to develop

34
00:01:45,590 --> 00:01:44,960
advanced propulsion concepts for air

35
00:01:49,190 --> 00:01:45,600
breathing

36
00:01:52,310 --> 00:01:49,200
aircraft

37
00:01:54,469 --> 00:01:52,320
we develop the engines we develop the

38
00:01:55,670 --> 00:01:54,479

propulsion components that are required

39
00:01:58,469 --> 00:01:55,680
to

40
00:02:00,870 --> 00:01:58,479
power these type of aircraft there are

41
00:02:03,109 --> 00:02:00,880
five types of propulsion concepts for

42
00:02:07,749 --> 00:02:03,119
stovle type aircraft

43
00:02:11,190 --> 00:02:07,759
vectored thrust ejector augmenter

44
00:02:14,229 --> 00:02:11,200
augmented lift system lift plus

45
00:02:17,430 --> 00:02:14,239
lift crews and the tandem fan

46
00:02:19,110 --> 00:02:17,440
configuration the one that we see

47
00:02:20,550 --> 00:02:19,120
the most of in the news today is the

48
00:02:22,949 --> 00:02:20,560
harrier and that's the vector

49
00:02:24,390 --> 00:02:22,959
thrust type of configuration it uses an

50
00:02:28,309 --> 00:02:24,400
engine has four

51
00:02:28,710 --> 00:02:28,319
variable nozzles on it that can be aimed

52
00:02:31,990 --> 00:02:28,720
in a

53
00:02:34,390 --> 00:02:32,000
either in the vertical direction or or

54
00:02:36,070 --> 00:02:34,400
horizontally for forward flight each of

55
00:02:39,110 --> 00:02:36,080
these systems have specific

56
00:02:40,470 --> 00:02:39,120
advantages and disadvantages but one of

57
00:02:43,430 --> 00:02:40,480
the main problems

58
00:02:45,670 --> 00:02:43,440
is one of technology there are several

59
00:02:48,070 --> 00:02:45,680
really key concepts that

60
00:02:49,270 --> 00:02:48,080
propulsion technologies that have to be

61
00:02:52,390 --> 00:02:49,280
developed

62
00:02:54,550 --> 00:02:52,400
one of the more obvious ones is that you

63
00:02:56,390 --> 00:02:54,560

in order to make these airplanes flyable

64
00:02:58,790 --> 00:02:56,400
you have to get lightweight

65
00:03:00,710 --> 00:02:58,800
propulsion systems nasa and the

66
00:03:03,190 --> 00:03:00,720
department of defense have a major

67
00:03:04,630 --> 00:03:03,200
activity going on to develop lightweight

68
00:03:07,830 --> 00:03:04,640
high thrust await

69
00:03:09,430 --> 00:03:07,840
basic engine concepts that applies to

70
00:03:11,430 --> 00:03:09,440
all advanced fighters

71
00:03:13,110 --> 00:03:11,440
in the case of stovall then there's some

72
00:03:15,589 --> 00:03:13,120
other special issues

73
00:03:16,949 --> 00:03:15,599
one is the lift concepts themselves the

74
00:03:20,949 --> 00:03:16,959
ejector system

75
00:03:23,430 --> 00:03:20,959
the raw system lift engines

76
00:03:25,270 --> 00:03:23,440
those all have to be the technologies

77
00:03:26,710 --> 00:03:25,280
associated with those concepts have to

78
00:03:28,149 --> 00:03:26,720
be developed

79
00:03:30,630 --> 00:03:28,159
specifically here at lewis we're

80
00:03:34,070 --> 00:03:30,640
investigating the ejector concept

81
00:03:39,589 --> 00:03:34,080
as part of our current program um

82
00:03:42,390 --> 00:03:39,599
then additional items uh on the list uh

83
00:03:43,830 --> 00:03:42,400
a lot of these concepts have uh complex

84
00:03:46,630 --> 00:03:43,840
internal ducting that

85
00:03:47,830 --> 00:03:46,640
that occurs inside the aircraft fan air

86
00:03:49,589 --> 00:03:47,840
collection systems

87
00:03:51,910 --> 00:03:49,599
valves and so on these things have to be

88
00:03:55,350 --> 00:03:51,920

developed to make them compact

89
00:03:57,670 --> 00:03:55,360
lightweight efficient yet at the same

90
00:04:00,390 --> 00:03:57,680
time not have large pressure losses

91
00:04:00,869 --> 00:04:00,400
at the 9 by 15 foot low speed wind

92
00:04:03,350 --> 00:04:00,879
tunnel

93
00:04:05,030 --> 00:04:03,360
at louis we are looking at some of the

94
00:04:08,390 --> 00:04:05,040
problem areas

95
00:04:09,910 --> 00:04:08,400
hot gas ingestion avoidance and ground

96
00:04:12,789 --> 00:04:09,920
flow field effects

97
00:04:13,990 --> 00:04:12,799
on stovall aircraft another technical

98
00:04:17,110 --> 00:04:14,000
problem that we're looking at

99
00:04:18,789 --> 00:04:17,120
is the hot gas ingestion problem

100
00:04:20,390 --> 00:04:18,799
this is where while many of these

101
00:04:22,710 --> 00:04:20,400
concepts have

102
00:04:25,430 --> 00:04:22,720
hot gas which is produced forward on the

103
00:04:28,310 --> 00:04:25,440
aircraft usually by burning fuel in

104
00:04:30,070 --> 00:04:28,320
in the vertical lift system this hot gas

105
00:04:32,390 --> 00:04:30,080
goes down hits the ground

106
00:04:34,790 --> 00:04:32,400
is is reflected back up and ingested by

107
00:04:39,189 --> 00:04:34,800
the inlet systems on the aircraft

108
00:04:41,270 --> 00:04:39,199
and turbine engines do not like hot gas

109
00:04:42,629 --> 00:04:41,280
they lose their power or they or

110
00:04:44,950 --> 00:04:42,639
something else happens and

111
00:04:46,790 --> 00:04:44,960
it's a major problem there are other

112
00:04:48,310 --> 00:04:46,800
problems that are associated with

113
00:04:50,710 --> 00:04:48,320

stovall aircraft

114
00:04:51,830 --> 00:04:50,720
and in conjunction with nasa langley

115
00:04:58,230 --> 00:04:51,840
research center

116
00:05:02,070 --> 00:04:58,240
its quest

117
00:05:04,469 --> 00:05:02,080
to produce a viable lightweight reliable

118
00:05:06,790 --> 00:05:04,479
propulsion system these aircraft have to

119
00:05:09,430 --> 00:05:06,800
operate efficiently at supersonic speeds

120
00:05:12,390 --> 00:05:09,440
as well as at very low speeds

121
00:05:14,310 --> 00:05:12,400
with very high air flows and as a result

122
00:05:16,150 --> 00:05:14,320
there's a problem of getting

123
00:05:18,390 --> 00:05:16,160
inlets that have high performance both

124
00:05:20,790 --> 00:05:18,400
at supersonic conditions and also at

125
00:05:21,510 --> 00:05:20,800
essentially static conditions while in

126
00:05:23,909 --> 00:05:21,520
hover

127
00:05:25,029 --> 00:05:23,919
possibly at high angles of attack which

128
00:05:29,110 --> 00:05:25,039
which result in

129
00:05:32,790 --> 00:05:29,120
in flow problems for the inlet system

130
00:05:33,670 --> 00:05:32,800
nozzle systems are a key problem here

131
00:05:35,670 --> 00:05:33,680
from the

132
00:05:37,590 --> 00:05:35,680
standpoint that they tend to be in

133
00:05:39,830 --> 00:05:37,600
today's aircraft very heavy if we

134
00:05:41,110 --> 00:05:39,840
put the kind of requirements that a

135
00:05:43,350 --> 00:05:41,120
stovall has so

136
00:05:44,390 --> 00:05:43,360
so a major program has to be evolved to

137
00:05:47,830 --> 00:05:44,400
develop advanced

138
00:05:48,950 --> 00:05:47,840

nozzle concepts and last but not least

139
00:05:52,150 --> 00:05:48,960
is the

140
00:05:54,550 --> 00:05:52,160
pilot and that is

141
00:05:55,590 --> 00:05:54,560
the pilot has to be able to control this

142
00:05:58,950 --> 00:05:55,600
beast while he's

143
00:06:01,430 --> 00:05:58,960
uh doing his mission and

144
00:06:03,990 --> 00:06:01,440
the harrier is a difficult aircraft to

145
00:06:07,430 --> 00:06:05,749
one of the areas that we in conjunction

146
00:06:09,590 --> 00:06:07,440
with aims we have a joint program with

147
00:06:12,390 --> 00:06:09,600
aim specifically in this area

148
00:06:13,350 --> 00:06:12,400
to address how do we get the right pilot

149
00:06:16,150 --> 00:06:13,360
interfaces

150
00:06:16,629 --> 00:06:16,160
there to fly the airplane in a manner

151
00:06:21,510 --> 00:06:16,639
which

152
00:06:23,189 --> 00:06:21,520
could build a stovall airplane today

153
00:06:25,590 --> 00:06:23,199
the problem is that it would be too

154
00:06:28,150 --> 00:06:25,600
heavy and not particularly practical

155
00:06:28,629 --> 00:06:28,160
for what it can do for a mission okay

156
00:06:30,469 --> 00:06:28,639
and

157
00:06:31,830 --> 00:06:30,479
the main thing that we're trying to

158
00:06:35,350 --> 00:06:31,840
develop now

159
00:06:35,670 --> 00:06:35,360
is a supersonic capability an aircraft

160
00:06:38,870 --> 00:06:35,680
with

161
00:06:41,270 --> 00:06:38,880
adequate range and reasonable payload

162
00:06:43,510 --> 00:06:41,280
and that that's the main thrust of of

163
00:06:45,909 --> 00:06:43,520

the advanced technology

164
00:06:47,909 --> 00:06:45,919
we know that stovall works it's a

165
00:06:49,510 --> 00:06:47,919
question of getting an aircraft which

166
00:06:51,189 --> 00:06:49,520
provides the