1
00:01:00,389 --> 00:00:58,150
aeronautic scientist

2
00:01:02,470 --> 00:01:00,399
charlie scanlon is heading up an effort

3
00:01:04,549 --> 00:01:02,480
at nasa's langley research center to

4
00:01:06,230 --> 00:01:04,559
provide flight crews with comprehensive

5
00:01:09,830 --> 00:01:06,240
weather information to use

6
00:01:12,230 --> 00:01:09,840
in rerouting around storms

7
00:01:13,270 --> 00:01:12,240
a touch sensitive screen provides access

8
00:01:16,230 --> 00:01:13,280
to when you have a

9
00:01:17,030 --> 00:01:16,240
display this one shows storms along the

10
00:01:19,590 --> 00:01:17,040
flight path

11
00:01:21,510 --> 00:01:19,600
and a history of their recent movements

12
00:01:22,950 --> 00:01:21,520
the system is called cockpit weather

13
00:01:25,670 --> 00:01:22,960

information needs or

14
00:01:27,910 --> 00:01:25,680
sea wind and it could save the airline

15
00:01:30,149 --> 00:01:27,920
six million dollars a year

16
00:01:32,310 --> 00:01:30,159
and how do pilots like united airlines

17
00:01:34,149 --> 00:01:32,320
steve gifford feel about having nasa's

18
00:01:38,870 --> 00:01:34,159
weather system in the cockpit

19
00:01:43,510 --> 00:01:40,950
another langley research team is

20
00:01:45,830 --> 00:01:43,520
evaluating this thermal bond inspection

21
00:01:47,990 --> 00:01:45,840
system designed to find corrosion or

22
00:01:49,910 --> 00:01:48,000
other problems in critical aircraft

23
00:01:52,230 --> 00:01:49,920
joints

24
00:01:53,990 --> 00:01:52,240
they're also testing a digital x-ray

25
00:01:57,350 --> 00:01:54,000
device that produces even more

26
00:01:59,429 --> 00:01:57,360
detailed images of existing corrosion

27
00:02:01,910 --> 00:01:59,439
the goal is to minimize the number of

28
00:02:03,590 --> 00:02:01,920
times a plane must be torn apart looking

29
00:02:05,830 --> 00:02:03,600
for these types of flaws

30
00:02:07,510 --> 00:02:05,840
and thus reduce the airline's staggering

31
00:02:10,949 --> 00:02:07,520
maintenance costs

32
00:02:13,110 --> 00:02:10,959
u.s air inspection foreman rusty jones

33
00:02:13,990 --> 00:02:13,120
it's a definite boost to us any

34
00:02:15,990 --> 00:02:14,000
reduction

35
00:02:17,990 --> 00:02:16,000
that we can come up with is very very

36
00:02:19,830 --> 00:02:18,000
important we have to produce a safe

37
00:02:49,430 --> 00:02:19,840
reliable dependable airplane

38
00:02:57,910 --> 00:02:51,670

every time a commercial airliner takes

39
00:03:03,110 --> 00:03:00,710
one in 13 flights is forced to change

40
00:03:05,270 --> 00:03:03,120
course to avoid storms

41
00:03:07,110 --> 00:03:05,280
choosing the most efficient path around

42
00:03:09,910 --> 00:03:07,120
bad weather is critical

43
00:03:10,390 --> 00:03:09,920
because fuel and overall operating costs

44
00:03:13,750 --> 00:03:10,400
are so

45
00:03:16,790 --> 00:03:13,760
high currently

46
00:03:19,110 --> 00:03:16,800
air dues rely primarily on imparted

47
00:03:20,470 --> 00:03:19,120
weather radar to determine which ground

48
00:03:23,030 --> 00:03:20,480
to fall

49
00:03:23,990 --> 00:03:23,040
but this radar can't see very far out

50
00:03:26,070 --> 00:03:24,000
ahead

51
00:03:28,550 --> 00:03:26,080
and it doesn't provide any information

52
00:03:30,070 --> 00:03:28,560
about storm cells beyond the one in

53
00:03:32,710 --> 00:03:30,080
front of it

54
00:03:34,789 --> 00:03:32,720
south central why aeronautics scientist

55
00:03:36,789 --> 00:03:34,799
charlie scanlan has been spending so

56
00:03:39,990 --> 00:03:36,799
much time in this simulator

57
00:03:40,710 --> 00:03:40,000
at nasa's langley research center he's

58
00:03:42,630 --> 00:03:40,720
heading up an

59
00:03:44,789 --> 00:03:42,640
effort to provide flight crews with

60
00:03:46,390 --> 00:03:44,799
better information to use in making

61
00:03:48,869 --> 00:03:46,400
reroute decisions

62
00:03:51,430 --> 00:03:48,879
okay a touch-sensitive screen provides

63
00:03:51,440 --> 00:03:56,309

this one shows storms along the flame

64
00:04:00,710 --> 00:03:59,429
movements lightning strike data and

65
00:04:02,630 --> 00:04:00,720
terminal forecast

66
00:04:03,910 --> 00:04:02,640
can also be called up on this same

67
00:04:06,949 --> 00:04:03,920
screen all

68
00:04:08,070 --> 00:04:06,959
at the touch of a finger we have no new

69
00:04:09,910 --> 00:04:08,080
weather products

70
00:04:11,830 --> 00:04:09,920
it's just a matter of taking what you

71
00:04:13,830 --> 00:04:11,840
have out there today

72
00:04:15,750 --> 00:04:13,840
putting it into a data stream and data

73
00:04:17,990 --> 00:04:15,760
linking it to the airplane

74
00:04:19,509 --> 00:04:18,000
the system is called cockpit weather

75
00:04:22,870 --> 00:04:19,519
information needs

76
00:04:23,110 --> 00:04:22,880
or sea wind to test it scanlan brought

77
00:04:26,870 --> 00:04:23,120
in

78
00:04:30,710 --> 00:04:26,880
united steep

79
00:04:33,510 --> 00:04:30,720
gifford all flew the same scenarios with

80
00:04:35,350 --> 00:04:33,520
and without the sea wind displays and

81
00:04:36,230 --> 00:04:35,360
when they had the graphical weather

82
00:04:38,150 --> 00:04:36,240
system

83
00:04:40,710 --> 00:04:38,160
they were able to make better reroute

84
00:04:42,710 --> 00:04:40,720
decisions than when they did not have it

85
00:04:43,990 --> 00:04:42,720
in fact they were able to fly on an

86
00:04:46,629 --> 00:04:44,000
average of five percent

87
00:04:48,150 --> 00:04:46,639
shorter distance when they had this

88
00:04:50,950 --> 00:04:48,160

extra tool

89
00:04:52,870 --> 00:04:50,960
five percent might not sound like much

90
00:04:55,990 --> 00:04:52,880
but with each of the major carriers

91
00:04:58,310 --> 00:04:56,000
flying close to 350 planes a day

92
00:05:00,310 --> 00:04:58,320
every day at a cost of over twelve

93
00:05:02,390 --> 00:05:00,320
hundred dollars an hour

94
00:05:03,909 --> 00:05:02,400
making better reroute decisions could

95
00:05:07,590 --> 00:05:03,919
save as much as six

96
00:05:10,230 --> 00:05:07,600
million dollars a year per airline

97
00:05:12,629 --> 00:05:10,240
efficiently avoiding storms also has an

98
00:05:15,029 --> 00:05:12,639
added advantage for passengers

99
00:05:17,029 --> 00:05:15,039
if you can make reroute decisions and

100
00:05:18,870 --> 00:05:17,039
stay away from the cells three times as

101
00:05:20,390 --> 00:05:18,880
far away it gives you smoother safer

102
00:05:22,469 --> 00:05:20,400
ride

103
00:05:24,870 --> 00:05:22,479
and how do pilots feel about having

104
00:05:28,710 --> 00:05:24,880
nasa's weather system in the cockpit

105
00:05:31,749 --> 00:05:28,720
can i have it yesterday i would love it

106
00:05:33,350 --> 00:05:31,759
it uh it's it's one thing that i could

107
00:05:35,270 --> 00:05:33,360
get very enthused over and

108
00:05:38,629 --> 00:05:35,280
having seen it in here i'd i'd like to

109
00:05:41,029 --> 00:05:38,639
be using it tomorrow

110
00:05:43,189 --> 00:05:41,039
nasa is also conducting other safety

111
00:05:46,070 --> 00:05:43,199
related research aimed at improving

112
00:05:48,629 --> 00:05:46,080
aircraft inspections keeping their

113
00:05:50,790 --> 00:05:48,639

planes fit to fly is an important part

114
00:05:52,870 --> 00:05:50,800
of any airline's mission

115
00:05:53,909 --> 00:05:52,880
in addition to daily maintenance checks

116
00:05:56,469 --> 00:05:53,919
at the gate

117
00:05:58,710 --> 00:05:56,479
every aircraft is regularly brought in

118
00:06:00,309 --> 00:05:58,720
to facilities like u.s airs in

119
00:06:02,909 --> 00:06:00,319
pittsburgh for more thorough

120
00:06:04,309 --> 00:06:02,919
checkouts and repairs a very

121
00:06:07,670 --> 00:06:04,319
labor-intensive

122
00:06:10,309 --> 00:06:07,680
costly process inspection foreman

123
00:06:11,510 --> 00:06:10,319
rusty jones it's incredible the amount

124
00:06:13,430 --> 00:06:11,520
of money that's spent

125
00:06:15,189 --> 00:06:13,440
we did an aging aircraft program here a

126
00:06:16,870 --> 00:06:15,199
few years ago uh

127
00:06:18,150 --> 00:06:16,880
looking for some significant problems we

128
00:06:19,270 --> 00:06:18,160
were spending an average of a million

129
00:06:23,110 --> 00:06:19,280
dollars an airplane

130
00:06:24,950 --> 00:06:23,120
just for that one check though expensive

131
00:06:27,670 --> 00:06:24,960
it's still more cost effective in

132
00:06:29,749 --> 00:06:27,680
today's economy to keep a plane flying

133
00:06:31,430 --> 00:06:29,759
than it is to replace it

134
00:06:33,270 --> 00:06:31,440
10 years ago you bought an airplane you

135
00:06:36,870 --> 00:06:33,280
threw it away after 10 years

136
00:06:40,309 --> 00:06:39,510
a key concern in extending an aircraft's

137
00:06:42,870 --> 00:06:40,319
lifespan

138
00:06:47,670 --> 00:06:42,880

is its susceptibility to corrosion or

139
00:06:52,070 --> 00:06:49,990
traditionally determining the extent of

140
00:06:52,950 --> 00:06:52,080
these flaws has been tearing planes

141
00:06:57,270 --> 00:06:52,960
apart

142
00:06:59,670 --> 00:06:57,280
again costly and time-consuming

143
00:07:01,350 --> 00:06:59,680
a few alternative non-destructive

144
00:07:02,469 --> 00:07:01,360
evaluation techniques have been

145
00:07:06,070 --> 00:07:02,479
developed

146
00:07:08,469 --> 00:07:06,080
this ultrasonic device is widely used

147
00:07:09,350 --> 00:07:08,479
but it's a time-consuming point-by-point

148
00:07:11,670 --> 00:07:09,360
system that

149
00:07:13,589 --> 00:07:11,680
ultimately relies upon operator

150
00:07:16,309 --> 00:07:13,599
interpretation

151
00:07:18,629 --> 00:07:16,319
looking for better ways to detect flaws

152
00:07:19,990 --> 00:07:18,639
another nasa langley research team is

153
00:07:23,029 --> 00:07:20,000
experimenting with this

154
00:07:28,710 --> 00:07:23,039
thermal bond inspection system

155
00:07:32,870 --> 00:07:31,189
small lamps are used to warm an area of

156
00:07:35,189 --> 00:07:32,880
the plane surface

157
00:07:37,749 --> 00:07:35,199
three or four degrees is all it takes

158
00:07:40,390 --> 00:07:37,759
for the camera to produce an image

159
00:07:42,150 --> 00:07:40,400
lighter areas indicate corrosion or

160
00:07:44,790 --> 00:07:42,160
joint problems

161
00:07:46,469 --> 00:07:44,800
group leader elliott cramer we can

162
00:07:48,550 --> 00:07:46,479
measure about a three foot by three foot

163
00:07:51,270 --> 00:07:48,560

square area at a time

164
00:07:52,550 --> 00:07:51,280
and by doing that large of an area then

165
00:07:55,350 --> 00:07:52,560
you can rapidly do

166
00:07:57,189 --> 00:07:55,360
an entire aircraft in addition to that

167
00:07:58,070 --> 00:07:57,199
it's an imaging technology so you have a

168
00:08:00,950 --> 00:07:58,080
picture when you're

169
00:08:01,990 --> 00:08:00,960
done and that picture can be stored and

170
00:08:03,670 --> 00:08:02,000
used later

171
00:08:05,270 --> 00:08:03,680
on subsequent inspections to see if

172
00:08:12,150 --> 00:08:05,280
there's been any changes

173
00:08:14,710 --> 00:08:12,160
in the character of that airplane

174
00:08:16,790 --> 00:08:14,720
langley researchers are also evaluating

175
00:08:18,469 --> 00:08:16,800
this digital x-ray system

176
00:08:20,550 --> 00:08:18,479
as a means of more accurately

177
00:08:22,950 --> 00:08:20,560
determining just how much corrosion

178
00:08:25,670 --> 00:08:22,960
exists in a given area

179
00:08:27,510 --> 00:08:25,680
it generates very detailed images that

180
00:08:29,430 --> 00:08:27,520
complement those produced with the

181
00:08:31,029 --> 00:08:29,440
thermal bond technology

182
00:08:32,469 --> 00:08:31,039
if you had a problem area that you found

183
00:08:33,589 --> 00:08:32,479
with the thermal system you can go in

184
00:08:36,949 --> 00:08:33,599
with the x-ray

185
00:08:40,709 --> 00:08:36,959
and use that to define how bad that area

186
00:08:43,509 --> 00:08:40,719
is research like this has the support

187
00:08:44,470 --> 00:08:43,519
of the airlines it's a definite boost to

188
00:08:46,790 --> 00:08:44,480

us any

189
00:08:48,070 --> 00:08:46,800
reduction that we can come up with is

190
00:08:49,910 --> 00:08:48,080
very very important

191
00:08:51,190 --> 00:08:49,920
we have to produce a safe reliable

192
00:08:57,990 --> 00:08:51,200
dependable airplane

193
00:09:04,389 --> 00:09:01,110
new in-cockpit weather displays and

194
00:09:06,790 --> 00:09:04,399
non-destructive evaluation techniques

195
00:09:08,310 --> 00:09:06,800
nasa research helping this country's