WEBVTT

1
00:00:04.355 --> 00:00:06.085
Okay, next up we have Major Cross

2
00:00:06.275 --> 00:00:07.405
with the Australian Army,

3
00:00:09.345 --> 00:00:12.085
and he is gonna talk to us today about, uh, risk management,

4
00:00:12.085 --> 00:00:14.205
lessons learned in experimental flight testing

5
00:00:19.125 --> 00:00:20.105
stages. Yours,

6
00:00:20.395 --> 00:00:21.395
Thank you.

7
00:00:23.175 --> 00:00:24.625
Afternoon. Thanks. The opportunity

8
00:00:24.885 --> 00:00:28.105
to address you on some lessons that we learned in, uh,

9
00:00:28.125 --> 00:00:30.105
the Roy Flk Attack helicopter program.

10
00:00:30.805 --> 00:00:33.065
Um, it's all relevant to the risk management issues

11
00:00:33.065 --> 00:00:35.385
that we've been discussing over the last couple of days.

12
00:00:38.965 --> 00:00:40.345
So to look at it, we'll

13
00:00:42.055 --> 00:00:43.425
have a look at some background history,

14
00:00:43.425 --> 00:00:45.985
where the program came from and how it developed

15
00:00:45.985 --> 00:00:49.625
and came into being the importance of training

16
00:00:50.245 --> 00:00:53.305
and proficiency and currency of crew, which is a vital part

17
00:00:53.305 --> 00:00:54.385
of the risk management process.

18
00:00:56.365 --> 00:00:59.945
The Roy Vol first XDM flight envelope expansion

19
00:00:59.965 --> 00:01:01.065
was the first prototype.

20
00:01:02.365 --> 00:01:03.945
Um, system safety

21
00:01:04.005 --> 00:01:05.305
and planning that went along

22
00:01:05.615 --> 00:01:08.145
with the initial envelope expansion floods,

23
00:01:09.205 --> 00:01:11.545
and this is all took place quite a number of years ago,

24
00:01:11.545 --> 00:01:13.465
but I think the risk management issues that are

25
00:01:14.155 --> 00:01:15.305
still applicable today

26
00:01:15.305 --> 00:01:17.625
and discussed today, they were applicable then

27
00:01:17.845 --> 00:01:20.625

and they don't really change.

28
00:01:22.115 --> 00:01:24.105
We'll have looked at some of the test conditions on the day,

29
00:01:25.445 --> 00:01:27.585
the emergency that resulted in rotation.

30
00:01:28.015 --> 00:01:31.395
Both engines essentially gone. The lessons learned.

31
00:01:31.465 --> 00:01:35.075
What was, what was addressed in the risk management process,

32
00:01:35.825 --> 00:01:38.315
what worked some issues that

33
00:01:39.055 --> 00:01:40.875
in hindsight were not addressed

34
00:01:41.015 --> 00:01:43.195
and reasons why they were perhaps masked

35
00:01:43.695 --> 00:01:46.795
and only came to the being after the incident.

36
00:01:49.215 --> 00:01:53.195
So the background in myself, I'm actually South African

37
00:01:53.295 --> 00:01:54.715
and this all occurred in South Africa.

38
00:01:55.635 --> 00:02:00.115
I did my wings in 1977, flew light aircraft for a couple

39
00:02:00.115 --> 00:02:01.915
of years, did instructors course,

40
00:02:01.915 --> 00:02:04.475
qualified flying instructor in 1980,

41
00:02:05.695 --> 00:02:07.905
converted onto roading in 1985,

42
00:02:09.085 --> 00:02:13.105
and a qualified flying instructor on helicopters in 1987.

43
00:02:13.855 --> 00:02:15.545
Took the test pilot school with

44
00:02:16.065 --> 00:02:19.145
national test pilot school in 1989 in South Africa.

45
00:02:19.415 --> 00:02:21.225
They came to South Africa at that time

46
00:02:22.285 --> 00:02:24.545
and started flying the Roy Faul in 1990.

47
00:02:26.805 --> 00:02:29.585
And in parallel was a production pilot on the Orx

48
00:02:29.755 --> 00:02:32.225
helicopter, essentially a hybrid

49
00:02:32.255 --> 00:02:34.345
between a puma and a super puma.

50
00:02:35.525 --> 00:02:37.745
And then I was the office commanding the Air Force base

51
00:02:37.875 --> 00:02:41.585
Oberg, the fire development center from 2005 and 2009.

52
00:02:42.765 --> 00:02:43.865
And then I went to Australia.

53
00:02:45.325 --> 00:02:47.345
So the background to the program,

54
00:02:48.165 --> 00:02:50.025

and there was a need for an armed helicopter

55
00:02:50.455 --> 00:02:53.105
because of the anglin conflict in the

56
00:02:53.105 --> 00:02:54.425
late seventies and early eighties.

57
00:02:54.425 --> 00:02:56.185
So the development started in 1980.

58
00:02:57.005 --> 00:02:59.285
The aircraft first flew in 84.

59
00:02:59.705 --> 00:03:03.325
It was based on allo three dynamics systems,

60
00:03:04.065 --> 00:03:06.205
and essentially just a capability demonstrator

61
00:03:06.225 --> 00:03:09.125
and gathering of a team in creating the capability, uh,

62
00:03:09.125 --> 00:03:10.685
as it was the first little like big project

63
00:03:10.745 --> 00:03:11.925
of this nature in the country.

64
00:03:13.425 --> 00:03:17.885
In parallel with the Roy Fox design of the first prototype,

65
00:03:17.905 --> 00:03:21.965
we had two PMJ model helicopters that were used as test beds

66
00:03:21.965 --> 00:03:25.085
for the development of the avionics, A-A-F-C-S

67
00:03:25.085 --> 00:03:27.085
and MMI as well as weapons.

68
00:03:29.425 --> 00:03:33.325
So XDM first flew in 1990, um,

69
00:03:33.865 --> 00:03:37.325
and the initial flights were all flight envelope expansion,

70
00:03:37.555 --> 00:03:40.245
sort of like focusing on performance and handling qualities

71
00:03:40.745 --> 00:03:42.605
and getting the aircraft up and away.

72
00:03:43.795 --> 00:03:46.095
The second prototype flew in May 92,

73
00:03:46.835 --> 00:03:49.535
and it incorporated all the advanced avionics weapons

74
00:03:49.595 --> 00:03:51.695
and digital A FCS sort of stuff.

75
00:03:54.455 --> 00:03:55.535
EDM incorporated.

76
00:03:55.535 --> 00:03:57.575
The lessons learned from the first two prototypes,

77
00:03:57.595 --> 00:04:00.335
and it is the, it was the production configuration

78
00:04:00.595 --> 00:04:03.255
and 12 of the aircraft we delivered from 1999

79
00:04:03.595 --> 00:04:05.775
and the flying operation now in the demo

80
00:04:05.985 --> 00:04:07.815
Democratic Republic of Congo.

81
00:04:09.935 --> 00:04:11.835

So pilot and test pilot training

82
00:04:12.225 --> 00:04:14.395
that has come out over the past few days

83
00:04:14.415 --> 00:04:15.555
as currency and proficiency.

84
00:04:15.985 --> 00:04:17.075
It's always very important.

85
00:04:17.895 --> 00:04:20.155
And although we live in an automated era,

86
00:04:20.815 --> 00:04:23.595
the importance in training, uh, of visual

87
00:04:23.695 --> 00:04:26.115
and oral cues are still vital

88
00:04:26.215 --> 00:04:27.795
and still essential, uh,

89
00:04:27.795 --> 00:04:29.315
as will become evident with this incident.

90
00:04:30.315 --> 00:04:34.035
Communication, um, is always vital in any, in any program.

91
00:04:35.135 --> 00:04:39.395
And then the team concept, um, the person you fly with,

92
00:04:39.535 --> 00:04:41.395
the currency of the person that you fly with.

93
00:04:41.835 --> 00:04:44.955
I was fortunate to have an FTE that did the course with me,

94
00:04:45.335 --> 00:04:47.795
and we were a team for five years, so we, we got

95
00:04:47.795 --> 00:04:49.115
to know one another extremely well.

96
00:04:49.575 --> 00:04:52.995
Um, we, uh, appreciated one another's skills and abilities,

97
00:04:53.415 --> 00:04:55.995
and I think in the whole process it's pretty vital

98
00:04:56.025 --> 00:04:58.355
that you have a good synergy in the cockpit.

99
00:04:59.015 --> 00:05:01.675
And then, as I say, with the crew resource management.

100
00:05:03.455 --> 00:05:05.235
So with the initial flight development

101
00:05:06.215 --> 00:05:09.515
or envelope expansion of the, the Roy flk XDM,

102
00:05:10.055 --> 00:05:11.795
the first 90 flights all went well.

103
00:05:12.065 --> 00:05:15.195
However, early on due to some, uh, vibration

104
00:05:15.195 --> 00:05:17.635
and resident issues in the lubrication system

105
00:05:17.695 --> 00:05:21.515
by the main gearbox, an oil leak was detected in the,

106
00:05:21.535 --> 00:05:22.795
around the alternator.

107
00:05:22.795 --> 00:05:27.475
Number two, a thorough risk management process was, was, um,

108
00:05:28.395 --> 00:05:31.915

approached and, uh, from that it was decided that

109
00:05:32.655 --> 00:05:35.795
to keep the program going ahead while they addressed the,

110
00:05:36.015 --> 00:05:37.715
the issues from an engineering perspective,

111
00:05:38.105 --> 00:05:40.475
that they would put a blanking pallet on, remove

112
00:05:40.475 --> 00:05:42.715
that alternator and put an invert on

113
00:05:42.715 --> 00:05:44.355
that would give you if you needed

114
00:05:44.695 --> 00:05:46.475
to get back about a 30 minutes.

115
00:05:47.015 --> 00:05:49.355
We tested mostly within 10 to 15 minutes

116
00:05:49.415 --> 00:05:51.035
of the test flight facility at

117
00:05:51.035 --> 00:05:52.515
Johannesburg International Airport.

118
00:05:52.935 --> 00:05:54.715
And so risk managed,

119
00:05:54.715 --> 00:05:56.515
we felt we had managed the issue quite well.

120
00:05:56.735 --> 00:05:59.245
And so we conduct carried on and conducted the flying

121
00:05:59.825 --> 00:06:02.645
and it all went well to roundabout nine, flight 90.

122
00:06:03.265 --> 00:06:05.285
And at that time, it was necessary for the aircraft

123
00:06:05.425 --> 00:06:07.605
to have the infrared, the pressors fitted,

124
00:06:08.275 --> 00:06:09.405
they were dually fitted.

125
00:06:09.735 --> 00:06:11.245
There was some envelope expansion

126
00:06:11.245 --> 00:06:14.285
and to ensure that everything was working well.

127
00:06:14.425 --> 00:06:16.605
And then we came, we came to the point where we needed

128
00:06:16.605 --> 00:06:18.045
to do engine re lights.

129
00:06:20.825 --> 00:06:24.725
So as I'd said the fire hazard issue, it occurred quite a,

130
00:06:24.775 --> 00:06:27.085
quite a while before, it was about 12, 15 months

131
00:06:27.085 --> 00:06:28.845
before it had been addressed,

132
00:06:29.305 --> 00:06:32.165
and we were quite happy that that was still under control

133
00:06:32.425 --> 00:06:35.205
and we thought that was not really an issue.

134
00:06:35.625 --> 00:06:37.565
And we had our get, get home capability.

135
00:06:37.585 --> 00:06:40.445

And we, as part of the test, obviously one

136
00:06:40.445 --> 00:06:42.285
of the first things you would do emergency would be

137
00:06:42.675 --> 00:06:43.885
what about an engine failure?

138
00:06:44.345 --> 00:06:45.685
So you do it over an airfield.

139
00:06:46.145 --> 00:06:48.365
Um, so it was the inverters, we were overhead,

140
00:06:48.585 --> 00:06:52.685
an airfield over a runway commenced at a safe altitude,

141
00:06:53.425 --> 00:06:55.445
and the, we decided

142
00:06:55.465 --> 00:06:59.245
to do it in Pretoria at the Air Force base water cliff along

143
00:06:59.245 --> 00:07:02.165
12,000 foot runway, an ideal sort of scenario

144
00:07:02.165 --> 00:07:05.085
with all the emergency services available should you require

145
00:07:05.085 --> 00:07:09.765
it As part of the safety and test planning.

146
00:07:09.785 --> 00:07:11.485
We were still in the development, uh,

147
00:07:11.535 --> 00:07:12.685
stage and all those sort of things.

148
00:07:12.685 --> 00:07:14.685
So telemetry control was in burg

149
00:07:14.795 --> 00:07:17.005
that was about 40, 45 kilometers away.

150
00:07:17.005 --> 00:07:18.405
But at the altitude that we'd be flying,

151
00:07:18.405 --> 00:07:20.005
we would've telemetry monitoring us,

152
00:07:20.065 --> 00:07:21.205
we would've communication.

153
00:07:21.205 --> 00:07:22.245
So that would all be good.

154
00:07:23.345 --> 00:07:27.285
We would've active circuit at water cliff with fighters, um,

155
00:07:28.005 --> 00:07:30.965
mirage's and Buccaneers Canberra, and then C one 30

156
00:07:30.965 --> 00:07:33.325
and C one 60 transporters and some light aircraft.

157
00:07:34.065 --> 00:07:35.965
But we were happy that from the risk management,

158
00:07:35.965 --> 00:07:38.805
we had applied ourselves to the best of our ability

159
00:07:39.225 --> 00:07:42.765
and all the things that we thought we should have identified

160
00:07:42.765 --> 00:07:44.485
that could go wrong had we identified.

161
00:07:45.105 --> 00:07:46.285
So what could go wrong.

162
00:07:46.465 --> 00:07:48.445

And we were, had a warm fuzzy feeling.

163
00:07:48.865 --> 00:07:51.525
We had gone through 90 odd flights without any incidents,

164
00:07:51.685 --> 00:07:53.965
mishaps or anything really exciting to report.

165
00:07:56.585 --> 00:07:58.285
So the test conditions on the day, the,

166
00:07:58.385 --> 00:08:00.205
the elevation is 4,500.

167
00:08:00.225 --> 00:08:01.565
We were gonna be at 7,000.

168
00:08:01.565 --> 00:08:04.525
So that's lots of altitude runway's extremely long.

169
00:08:04.865 --> 00:08:06.725
And there's taxiways full length

170
00:08:06.725 --> 00:08:08.565
of the runway on the eastern and the western side.

171
00:08:09.685 --> 00:08:11.405
I mentioned about the aircraft in the circuit,

172
00:08:11.825 --> 00:08:12.925
but we didn't, we hadn't really

173
00:08:12.925 --> 00:08:14.365
contemplated that they would be an issue.

174
00:08:14.665 --> 00:08:17.085
We would do this at a, at v wide, about 80 knots.

175
00:08:17.585 --> 00:08:19.285
The weather was good, temperature was fine,

176
00:08:19.585 --> 00:08:20.605
and it was early morning.

177
00:08:21.105 --> 00:08:22.445
So we were ready for the test.

178
00:08:25.375 --> 00:08:27.395
So we wedu shut down engine number one

179
00:08:28.215 --> 00:08:30.635
and there was nothing to report.

180
00:08:31.055 --> 00:08:32.195
The other engine was running

181
00:08:32.655 --> 00:08:34.355
and we were flying, and so that was good.

182
00:08:34.455 --> 00:08:36.915
So we commenced with the engine relight.

183
00:08:38.255 --> 00:08:42.355
We then had a total electrical failure engine number two

184
00:08:42.895 --> 00:08:47.235
in this mode within default to about, uh, 82% ng,

185
00:08:49.825 --> 00:08:51.005
but there was worse to come.

186
00:08:51.005 --> 00:08:53.365
There was now no communication, no ICS,

187
00:08:53.365 --> 00:08:56.005
there's no communication between front seat and back seat.

188
00:08:56.705 --> 00:08:58.525
Uh, the flight engineer was in the front.

189
00:08:58.945 --> 00:09:01.045

He had a tacker meter,

190
00:09:01.625 --> 00:09:03.805
but unfortunately in the back cockpit there were no

191
00:09:03.805 --> 00:09:05.005
engine temps and pressures.

192
00:09:05.005 --> 00:09:08.365
Nothing was working, no flight instruments were working

193
00:09:09.025 --> 00:09:11.005
and no telemetry.

194
00:09:11.065 --> 00:09:13.005
So telemetry was lost at this stage as well.

195
00:09:13.625 --> 00:09:16.365
The only thing functioning were the Peter statics,

196
00:09:16.745 --> 00:09:19.325
so air speed, vertical speed, and ultimatum.

197
00:09:23.765 --> 00:09:26.985
So the only option at this stage is to enter rotation

198
00:09:27.685 --> 00:09:29.785
as you always train, focus on flying the aircraft

199
00:09:30.205 --> 00:09:31.905
and then try and manage

200
00:09:32.285 --> 00:09:36.065
and get an engine lighted if possible as you're coming down.

201
00:09:37.165 --> 00:09:40.185
One important factor is that, um, with the oral cues,

202
00:09:40.985 --> 00:09:42.305
NR min was 2 45.

203
00:09:43.625 --> 00:09:46.105
NR max was two 90, but I didn't have an indication.

204
00:09:46.885 --> 00:09:48.735
The fellow in front did have an indication.

205
00:09:48.895 --> 00:09:52.015
I was chatting team to Egon in the last week or two,

206
00:09:52.315 --> 00:09:55.215
and he said, um, it was quite disconcerting from his

207
00:09:55.215 --> 00:09:57.975
perspective because he could see the NRA increasing,

208
00:09:58.635 --> 00:09:59.895
but he didn't know what I was doing.

209
00:09:59.915 --> 00:10:01.055
And when something, when I did,

210
00:10:01.085 --> 00:10:04.015
when I raised the collective, he was fairly happy

211
00:10:04.015 --> 00:10:05.815
because he said, okay, well he, he, he's got some sort

212
00:10:05.815 --> 00:10:08.055
of thing to monitor and control it with.

213
00:10:08.555 --> 00:10:09.735
But when the aircraft rolled,

214
00:10:09.875 --> 00:10:11.695
he wasn't too sure whether it was a commanded

215
00:10:11.695 --> 00:10:15.495
or un uncommanded role, but credit to his training

216
00:10:15.715 --> 00:10:18.855

and our crew sort of like compatibility

217
00:10:18.915 --> 00:10:19.935
and confidence in one another.

218
00:10:20.155 --> 00:10:23.175
He, he left it there and enjoyed an unpleasant ride.

219
00:10:24.875 --> 00:10:26.975
So we, um, I attempted the real light

220
00:10:27.315 --> 00:10:30.095
and in hindsight it was never gonna happen.

221
00:10:30.875 --> 00:10:33.815
But, um, we now we turned it to the right,

222
00:10:33.955 --> 00:10:36.455
to the eastern side, and now we had

223
00:10:36.455 --> 00:10:38.295
to avoid fuel dumps and bomb dumps.

224
00:10:39.035 --> 00:10:41.255
The first thing I had was an open field, so I thought, well,

225
00:10:41.255 --> 00:10:42.335
we'll head for the open field.

226
00:10:42.645 --> 00:10:44.535
That will be somewhere

227
00:10:44.535 --> 00:10:47.295
where you could conduct a fairly safe landing.

228
00:10:47.925 --> 00:10:49.375
What is really in, uh,

229
00:10:49.375 --> 00:10:53.295
pleasing from per personal perspective was the oral cues on

230
00:10:53.295 --> 00:10:57.775
the aircraft, um, are particularly noticeable.

231
00:10:57.995 --> 00:11:01.615
Um, the normal tone around about 2 60, 2 70 sort

232
00:11:01.615 --> 00:11:04.375
of like remains constant until around about two 80 raves.

233
00:11:04.635 --> 00:11:07.175
And then the tone picks up quite markedly in that point.

234
00:11:07.175 --> 00:11:09.735
Then the revs start increasing quite, quite rapidly as well.

235
00:11:10.395 --> 00:11:13.095
So all the way down, all you, all I knew I had to do was

236
00:11:14.285 --> 00:11:15.575
keep the collective on the bottom.

237
00:11:16.115 --> 00:11:18.695
If at any stage the revs got to that point, we had started,

238
00:11:18.715 --> 00:11:20.015
the tone changed markedly,

239
00:11:20.015 --> 00:11:21.495
and they started, the red started increasing.

240
00:11:22.005 --> 00:11:24.815
Take a handful, a thousand, 1000

241
00:11:24.815 --> 00:11:27.655
and 2003, put it down, the noise went away.

242
00:11:27.955 --> 00:11:29.815
The, the, the waves had sort of come back to

243
00:11:29.815 --> 00:11:32.575

where they needed to be and we managed to get

244
00:11:32.575 --> 00:11:34.535
around the field and get around the circuit,

245
00:11:34.985 --> 00:11:36.295
avoid the aircraft in the circuit

246
00:11:36.295 --> 00:11:38.655
and landed on the eastern taxiway.

247
00:11:41.775 --> 00:11:44.355
So the risk management, what went right, what went wrong,

248
00:11:44.855 --> 00:11:46.155
why did we miss some of the things?

249
00:11:46.575 --> 00:11:48.915
As was mentioned on the opening day, the number of accidents

250
00:11:48.915 --> 00:11:50.955
that have occurred, they certainly didn't occur

251
00:11:50.955 --> 00:11:53.075
because there was no risk management

252
00:11:53.705 --> 00:11:55.045
or anything along those lines.

253
00:11:56.155 --> 00:11:59.085
That fire hazard we had identified had been treated

254
00:11:59.745 --> 00:12:01.685
and it wasn't initiated to be taken care of.

255
00:12:03.335 --> 00:12:06.705
However, I think with the time period that had gone on, um,

256
00:12:07.085 --> 00:12:09.625
all going well, it attended to mask the things

257
00:12:09.625 --> 00:12:12.465
that we didn't pay enough attention to.

258
00:12:12.685 --> 00:12:14.865
The fact that we're now going to relight an engine

259
00:12:15.165 --> 00:12:18.265
and we're not having an alternator on the other engine.

260
00:12:18.685 --> 00:12:20.105
Um, what would that effect be?

261
00:12:22.365 --> 00:12:23.625
The other thing that we didn't consider,

262
00:12:23.625 --> 00:12:25.585
which would've probably highlighted this issue is, um,

263
00:12:25.585 --> 00:12:27.905
while you're on the ground, why not conduct a dry run?

264
00:12:28.685 --> 00:12:32.025
Do the start take away the, the power ground power units

265
00:12:32.815 --> 00:12:34.465
shut down engine one, you're now shut,

266
00:12:34.565 --> 00:12:36.425
now you're now on the ground in the same condition

267
00:12:36.425 --> 00:12:38.545
as you would be at a, except at 8,000 foot.

268
00:12:38.965 --> 00:12:40.385
And then try and start the engine.

269
00:12:40.485 --> 00:12:43.185
And I'm quite sure you would've got the same effect

270
00:12:43.485 --> 00:12:45.305

and then you wouldn't have had the excitement either.

271
00:12:46.725 --> 00:12:49.465
But that was one of those things, the engine failure,

272
00:12:49.565 --> 00:12:51.705
you know, you can sort of like say, did we plan for it?

273
00:12:51.705 --> 00:12:52.785
We certainly planned for it.

274
00:12:52.785 --> 00:12:54.825
We had a plan, we executed the plan and,

275
00:12:55.005 --> 00:12:56.145
and, and, and was safe.

276
00:12:56.885 --> 00:12:59.425
But the question I ask you now, and I,

277
00:12:59.425 --> 00:13:01.585
and I've asked myself over the last couple of years,

278
00:13:02.085 --> 00:13:03.745
did we really expect it in the planning?

279
00:13:03.925 --> 00:13:05.185
And the answer is no, not really,

280
00:13:05.185 --> 00:13:08.865
because you go through the process, you apply the process,

281
00:13:09.565 --> 00:13:11.585
but are you expecting to have

282
00:13:11.585 --> 00:13:14.985
to execute those emergency procedures and all the rest of it

283
00:13:14.985 --> 00:13:17.905
because you, you, you have gone through the motion,

284
00:13:18.125 --> 00:13:19.465
you have addressed the issue,

285
00:13:20.125 --> 00:13:23.105
but have you really got those things really that you think,

286
00:13:23.665 --> 00:13:25.505
I, I, I'm really gonna expect this to happen?

287
00:13:26.085 --> 00:13:29.985
So when it does happen, you um, have,

288
00:13:29.985 --> 00:13:31.265
maybe your preparation

289
00:13:31.285 --> 00:13:32.625
is probably a little bit more thorough.

290
00:13:33.565 --> 00:13:38.035
For instance, um, there probably was no need

291
00:13:38.175 --> 00:13:41.155
to have to deviate around fuel dumps and bomb dumps

292
00:13:42.275 --> 00:13:45.085
because a better approach you would've been

293
00:13:45.505 --> 00:13:46.725
to just have a straight in

294
00:13:46.925 --> 00:13:48.925
approach, start short of the runway.

295
00:13:49.105 --> 00:13:51.885
You could even conducted a practice alteration

296
00:13:51.885 --> 00:13:55.165
with both engines running, get down to the height, see

297
00:13:55.165 --> 00:13:56.365

that you can get in, you,

298
00:13:56.465 --> 00:13:58.125
you've checked the conditions on the day,

299
00:13:58.545 --> 00:14:00.165
the prevailing winds, and,

300
00:14:00.305 --> 00:14:03.965
and then you've also got clearance from air traffic control

301
00:14:04.625 --> 00:14:06.405
so that when you, once you conduct the test,

302
00:14:06.405 --> 00:14:08.125
you're at the alt your test altitude,

303
00:14:08.125 --> 00:14:10.005
they've got the circuit clear for you, the runway clear

304
00:14:10.005 --> 00:14:12.765
for you, and then you could enter, you can prepare,

305
00:14:13.255 --> 00:14:16.085
start conducting the test and if needs be,

306
00:14:16.505 --> 00:14:18.165
and then enter auto rotation

307
00:14:18.625 --> 00:14:20.165
and conduct a straighten landing.

308
00:14:22.545 --> 00:14:25.245
But on the day it all worked, worked out well.

309
00:14:26.045 --> 00:14:28.685
I think what was was pretty crucial in the success

310
00:14:28.865 --> 00:14:33.245
and the successful outcome was the crew resource management.

311
00:14:33.545 --> 00:14:35.485
It worked out well. We had been

312
00:14:35.865 --> 00:14:37.245
flying together for a long time.

313
00:14:37.455 --> 00:14:39.725
There was an appreciation of one another's skills

314
00:14:39.825 --> 00:14:41.805
and what one another brought to the party.

315
00:14:42.345 --> 00:14:45.805
And, um, he, we, he is happy to be the passenger

316
00:14:46.345 --> 00:14:47.525
and not interfere,

317
00:14:48.125 --> 00:14:49.885
although he wasn't too sure that I was in control

318
00:14:49.885 --> 00:14:51.245
of anything in, in any case.

319
00:14:53.335 --> 00:14:55.755
So team synergy is vital for efficient

320
00:14:55.755 --> 00:14:58.195
and coordinated testing at the best of times,

321
00:14:58.335 --> 00:15:01.275
but particularly also, so in, in the event of an emergency,

322
00:15:02.225 --> 00:15:04.715
know your team, have confidence in your team

323
00:15:05.095 --> 00:15:06.235
and respect their skillset.

324
00:15:09.055 --> 00:15:11.035

Be focused. And it was mentioned

325
00:15:11.035 --> 00:15:12.915
by I think Darren in the first presentation,

326
00:15:13.485 --> 00:15:16.195
avoid complacency when things are going well for too long,

327
00:15:16.645 --> 00:15:17.875
think about that volcano

328
00:15:17.975 --> 00:15:20.075
or that earthquake you closer

329
00:15:20.175 --> 00:15:22.315
to when something can potentially go wrong.

330
00:15:23.255 --> 00:15:27.395
Always expect the worst and then plan accordingly.

331
00:15:29.465 --> 00:15:32.255
Thank you. Are there any questions?

332
00:15:51.605 --> 00:15:54.655
When you found that it was time to remove the alternator

333
00:15:54.655 --> 00:15:57.575
and replace it with the inverter, what kind of limitation

334
00:15:57.755 --> 00:16:00.295
or attachment did that have for anyone

335
00:16:00.295 --> 00:16:02.055
who further would use the aircraft other than you?

336
00:16:02.685 --> 00:16:05.335
Just say that again, sorry. At some point you removed

337
00:16:05.335 --> 00:16:06.975
the alternator and replaced it with the inverter.

338
00:16:06.995 --> 00:16:09.935
Yep. Uh, was there some sort of limitation that flewed

339
00:16:09.935 --> 00:16:12.055
with the aircraft or with the test team,

340
00:16:12.515 --> 00:16:14.215
uh, for downstream effects? At that time

341
00:16:14.585 --> 00:16:15.975
There were no further limitations.

342
00:16:16.035 --> 00:16:17.455
As I said, we had, um,

343
00:16:17.455 --> 00:16:20.775
because we operated pretty close to the, the airfield

344
00:16:20.955 --> 00:16:24.295
or the airport where we operated from, we had a git, um,

345
00:16:24.425 --> 00:16:26.655
capability where we were operating.

346
00:16:26.655 --> 00:16:27.695
There were numerous fields

347
00:16:27.795 --> 00:16:30.215
and air fields that you could land on if you, if you,

348
00:16:30.215 --> 00:16:32.095
if you needed to land immediately in your

349
00:16:32.255 --> 00:16:33.975
vicinity as a test team.

350
00:16:34.475 --> 00:16:36.055
Um, we had two crews

351
00:16:36.595 --> 00:16:38.095

and each, the crew sort

352
00:16:38.095 --> 00:16:39.775
of like alternated from flight to flight.

353
00:16:39.795 --> 00:16:41.695
So everybody was on the same page with

354
00:16:41.695 --> 00:16:43.575
where you were in the development, uh,

355
00:16:43.575 --> 00:16:44.895
where you were with the program.

356
00:16:45.595 --> 00:16:49.415
Um, it gave the team that was arguably to say off

357
00:16:49.415 --> 00:16:52.295
for the day in, in the control room time to get the admin

358
00:16:52.295 --> 00:16:53.975
and things up to, up to date.

359
00:16:54.515 --> 00:16:58.255
But you always as the, as the team pretty much a phase to

360
00:16:58.255 --> 00:16:59.295
where the program was and

361
00:16:59.295 --> 00:17:00.535
what the status of the program was.

362
00:17:01.245 --> 00:17:03.135
It's a, it's a thought that I had, uh,

363
00:17:03.135 --> 00:17:04.975
currently working on a slightly larger program

364
00:17:05.565 --> 00:17:08.415
that we always have a fear that with such a large program

365
00:17:08.565 --> 00:17:10.735
that someone might not realize the implication

366
00:17:10.735 --> 00:17:11.895
of some change we've made.

367
00:17:12.275 --> 00:17:14.775
So the documentation effort tends to go a little further,

368
00:17:15.475 --> 00:17:17.655
but explore all the downstream effects of what you've done,

369
00:17:17.755 --> 00:17:19.135
not just agree that, uh,

370
00:17:19.485 --> 00:17:21.935
that we all understand what's happening, but,

371
00:17:22.075 --> 00:17:24.095
but sometimes that's something you feel like you

372
00:17:24.095 --> 00:17:25.175
don't need on a smaller program.

373
00:17:25.275 --> 00:17:27.695
But in this case, seems like that would've been one place

374
00:17:27.715 --> 00:17:30.495
to catch downstream effects of having done this replacement

375
00:17:30.875 --> 00:17:32.295
or this work around for flight test.

376
00:17:32.525 --> 00:17:33.525
Sure.

377
00:17:40.825 --> 00:17:44.055
Thank you Trevor. Thank you, uh, not only for the brief

378
00:17:44.055 --> 00:17:45.175

but for this back on top.

379
00:17:46.385 --> 00:17:49.325
Thank You.

380
00:17:50.975 --> 00:17:51.645
Thank you very much.

381
00:17:55.555 --> 00:17:58.205
Alright. Uh, Trevor got us back on time there, so

382
00:17:58.895 --> 00:18:00.765
we'll take a break now until 1500.

383
00:18:00.865 --> 00:18:02.645
If everybody get back in your seats 1500,

384
00:18:02.645 --> 00:18:05.285
we'll kick it off again and try and get done on time.

385
00:18:05.425 --> 00:18:05.845
Thanks.