
NASA
Ames
Dryden

1
00:00:05,930 --> 00:00:03,649
last item an agenda here is a wrap-up

2
00:00:09,169 --> 00:00:05,940
and returning to our own ed Saltzman for

3
00:00:12,160 --> 00:00:09,179
that that is currently a senior Aaron am

4
00:00:15,950 --> 00:00:12,170
assist with Ken transplanting research

5
00:00:18,019 --> 00:00:15,960
corp staff here at Dryden he's had a no

6
00:00:20,950 --> 00:00:18,029
noteworthy career as an aerodynamicist

7
00:00:23,750 --> 00:00:20,960
for over 40 years with naca and NASA

8
00:00:26,450 --> 00:00:23,760
although he retired from Dryden and NASA

9
00:00:29,150 --> 00:00:26,460
in 1981 he's continued to work here

10
00:00:30,830 --> 00:00:29,160
part-time for one of our engineering

11
00:00:33,590 --> 00:00:30,840
support service contractors as I

12
00:00:35,360 --> 00:00:33,600
previously mentioned and his career has

13
00:00:37,370 --> 00:00:35,370

been spent in conducting aerodynamic

14
00:00:40,850 --> 00:00:37,380
research as it affects the performance

15
00:00:43,400 --> 00:00:40,860
of vehicles aircraft and ground vehicles

16
00:00:46,729 --> 00:00:43,410
and some of you may know that in the

17
00:00:48,580 --> 00:00:46,739
early 70s are the mid 70s and early 80s

18
00:00:53,540 --> 00:00:48,590
he was involved in some work involving

19
00:00:56,990 --> 00:00:53,550
trucks and vans in the era of the first

20
00:01:26,910 --> 00:00:57,000
energy crisis so at Salzman wrap up

21
00:01:34,750 --> 00:01:31,650
okay thank you we're going to need that

22
00:01:36,730 --> 00:01:34,760
most of us here are or have been

23
00:01:39,220 --> 00:01:36,740
Associates of the dryden flight research

24
00:01:43,060 --> 00:01:39,230
facility and I want to underline the

25
00:01:44,680 --> 00:01:43,070
word Dryden remember that one and today

26
00:01:46,440 --> 00:01:44,690
we have honored and dedicated the

27
00:01:49,690 --> 00:01:46,450
supercritical wing research airplane

28
00:01:52,930 --> 00:01:49,700
which is in my mind a significant

29
00:01:55,230 --> 00:01:52,940
transonic research facility and I want

30
00:01:57,630 --> 00:01:55,240
to underline the word transonic

31
00:02:01,260 --> 00:01:57,640
transonic and Dryden how do they relate

32
00:02:04,000 --> 00:02:01,270
i'm going to try to establish a link and

33
00:02:07,510 --> 00:02:04,010
i believe we will show that there is a

34
00:02:12,970 --> 00:02:07,520
link between Dryden and transonic first

35
00:02:15,460 --> 00:02:12,980
next though I'll indicate for items I

36
00:02:18,820 --> 00:02:15,470
want to cover I want to recognize the

37
00:02:23,740 --> 00:02:18,830
man Dryden and the place Dryden which is

38
00:02:25,960 --> 00:02:23,750

us relative to experimental transonic

39
00:02:28,510 --> 00:02:25,970
aerodynamics I also want to recognize

40
00:02:30,699 --> 00:02:28,520
the inventor of the supercritical wing

41
00:02:32,890 --> 00:02:30,709
concept and how he dominated

42
00:02:37,330 --> 00:02:32,900
experimental transonic aerodynamics for

43
00:02:39,310 --> 00:02:37,340
at least three decades I want to

44
00:02:43,090 --> 00:02:39,320
proclaim that transonic research is not

45
00:02:47,350 --> 00:02:43,100
just history and the transonic problems

46
00:02:49,420 --> 00:02:47,360
will surely still confront us and then

47
00:02:51,960 --> 00:02:49,430
lastly I want to recognize the people

48
00:02:55,330 --> 00:02:51,970
who worked on the super critical

49
00:03:01,060 --> 00:02:55,340
research airplane here but now that back

50
00:03:02,620 --> 00:03:01,070
to Dryden and transonic and I got to

51
00:03:13,150 --> 00:03:02,630
learn how to work this which button do I

52
00:03:22,309 --> 00:03:17,090
Dryden and transonic we want to

53
00:03:26,090 --> 00:03:22,319
establish now what transonic is in early

54
00:03:31,520 --> 00:03:26,100
nineteen forty seven this is the way

55
00:03:33,890 --> 00:03:31,530
transonic research was considered and as

56
00:03:36,830 --> 00:03:33,900
you can see there was quite a gap in

57
00:03:39,590 --> 00:03:36,840
theory there were three experimental

58
00:03:49,060 --> 00:03:39,600
methods that were going through the

59
00:03:52,670 --> 00:03:49,070
transonic region but those three

60
00:03:56,290 --> 00:03:52,680
experimental methods were qualitative in

61
00:03:58,910 --> 00:03:56,300
nature the instrumentation was marginal

62
00:04:01,120 --> 00:03:58,920
two of them required to telemetry which

63
00:04:03,430 --> 00:04:01,130

hadn't been developed that well yet and

64
00:04:06,530 --> 00:04:03,440
there you were going to have to

65
00:04:09,080 --> 00:04:06,540
establish better theory either on the

66
00:04:10,759 --> 00:04:09,090
basis of wind tunnel work or flight and

67
00:04:13,160 --> 00:04:10,769
as you can see the airplane hadn't gone

68
00:04:19,370 --> 00:04:13,170
supersonic yet or Trenton even the speed

69
00:04:25,490 --> 00:04:19,380
of sound and the wind tunnels were close

70
00:04:27,110 --> 00:04:25,500
to getting there the slotted tunnel was

71
00:04:30,920 --> 00:04:27,120
being worked on a matter of fact dr.

72
00:04:34,040 --> 00:04:30,930
Wickham was working on it but the plan

73
00:04:35,990 --> 00:04:34,050
was to establish a transonic research

74
00:04:37,580 --> 00:04:36,000
facility for flight as well as

75
00:04:44,190 --> 00:04:37,590
completing the slotted throat work in

76
00:04:51,880 --> 00:04:48,610
later in nineteen forty seven the

77
00:04:54,700 --> 00:04:51,890
aircraft designed for flight work in the

78
00:04:58,150 --> 00:04:54,710
transonic region flu Mach 1 in fact it

79
00:05:00,160 --> 00:04:58,160
got tamaqua number one point 06 later

80
00:05:03,310 --> 00:05:00,170
this airplane flew to nearly

81
00:05:05,530 --> 00:05:03,320
one-and-a-half a later pumped up version

82
00:05:07,240 --> 00:05:05,540
reached almost two and a half but the

83
00:05:09,160 --> 00:05:07,250
thing we should remember is that this

84
00:05:12,850 --> 00:05:09,170
was basically a transonic research

85
00:05:17,520 --> 00:05:12,860
facility and that's my first link

86
00:05:20,740 --> 00:05:17,530
between the place dryden in this case in

87
00:05:28,510 --> 00:05:20,750
transonic research because the place

88
00:05:30,190 --> 00:05:28,520

dryden is us we r is namesake the x1 in

89
00:05:35,920 --> 00:05:30,200
flying through the transonic drag your

90
00:05:39,100 --> 00:05:35,930
eyes provided a valuable source of data

91
00:05:40,930 --> 00:05:39,110
or a wing pressure profile data at

92
00:05:43,720 --> 00:05:40,940
transonic speeds as well as the building

93
00:05:46,180 --> 00:05:43,730
control and loads data but I want to

94
00:05:49,780 --> 00:05:46,190
point out here the pride doesn't show

95
00:05:51,130 --> 00:05:49,790
very well but here in flight data from

96
00:05:52,810 --> 00:05:51,140
the eight percent wing and the ten

97
00:05:55,480 --> 00:05:52,820
percent wing where we see drag

98
00:05:59,680 --> 00:05:55,490
coefficient plotted against Mach number

99
00:06:01,000 --> 00:05:59,690
and the this transonic drag rise which

100
00:06:04,500 --> 00:06:01,010
leveled off right about there and

101
00:06:08,470 --> 00:06:04,510
proceeded when it went faster is the

102
00:06:11,140 --> 00:06:08,480
drag rise that I want to show a little

103
00:06:13,890 --> 00:06:11,150
later in some very very early work done

104
00:06:16,630 --> 00:06:13,900
by dr. Dryden and is it also the

105
00:06:18,550 --> 00:06:16,640
increment of drag the doctor Wickham

106
00:06:25,060 --> 00:06:18,560
reduced with the area rule which will

107
00:06:28,990 --> 00:06:25,070
also talk about in a little bit now I

108
00:06:32,850 --> 00:06:29,000
want to go a way back in aerodynamic

109
00:06:36,280 --> 00:06:32,860
research history back almost as far as a

110
00:06:39,400 --> 00:06:36,290
doctor mature went earlier this morning

111
00:06:42,040 --> 00:06:39,410
not quite that far back perhaps in this

112
00:06:44,830 --> 00:06:42,050
case let's see let's pick out something

113
00:06:47,830 --> 00:06:44,840

like will say the invention of the steam

114
00:06:49,360 --> 00:06:47,840
engine would be one end of the time

115
00:06:51,969 --> 00:06:49,370
scale we're talking about and the other

116
00:06:57,200 --> 00:06:51,979
end might be as far back as milk

117
00:07:05,490 --> 00:07:01,860
at that time a young PhD named Hugh

118
00:07:08,970 --> 00:07:05,500
Dryden and two co-workers obtained the

119
00:07:10,590 --> 00:07:08,980
first data from a ground facility that

120
00:07:17,120 --> 00:07:10,600
showed the beginnings of the transonic

121
00:07:19,800 --> 00:07:17,130
drag rise here we have drag coefficient

122
00:07:22,020 --> 00:07:19,810
plotted against in this case they called

123
00:07:24,210 --> 00:07:22,030
it V over C I wish that showed better

124
00:07:29,160 --> 00:07:24,220
for you that are back quite a ways take

125
00:07:30,810 --> 00:07:29,170
my word for it this is V over C test

126
00:07:33,330 --> 00:07:30,820
velocity divided by the speed of sound

127
00:07:35,340 --> 00:07:33,340
plotted against drag coefficient for two

128
00:07:38,250 --> 00:07:35,350
airfoils of different thicknesses and

129
00:07:42,860 --> 00:07:38,260
what they were doing at that time was

130
00:07:47,760 --> 00:07:42,870
evaluating airfoil drag characteristics

131
00:07:49,590 --> 00:07:47,770
for propeller research airplanes at this

132
00:07:51,990 --> 00:07:49,600
time are flying about 100 miles an hour

133
00:08:01,140 --> 00:07:52,000
most of them the absolute speed record

134
00:08:03,390 --> 00:08:01,150
was below 280 to get these data they had

135
00:08:05,700 --> 00:08:03,400
to travel to Lynn Massachusetts and

136
00:08:08,400 --> 00:08:05,710
borrow a compressor that was owned by

137
00:08:12,330 --> 00:08:08,410
General Electric Company this compressor

138
00:08:14,910 --> 00:08:12,340

was a 5,000 horsepower compressor that

139
00:08:16,980 --> 00:08:14,920
they used to pressurize a large tank

140
00:08:19,290 --> 00:08:16,990
that was about 30 feet long and 30

141
00:08:21,210 --> 00:08:19,300
inches in diameter and at one end of

142
00:08:23,610 --> 00:08:21,220
this they had an opening of 12 inches

143
00:08:27,210 --> 00:08:23,620
below which they placed their air for

144
00:08:30,980 --> 00:08:27,220
models this in other words this was the

145
00:08:33,060 --> 00:08:30,990
free jet it was very noisy and

146
00:08:37,170 --> 00:08:33,070
incidentally they had to use this

147
00:08:39,450 --> 00:08:37,180
borrowed compressor system just when

148
00:08:41,790 --> 00:08:39,460
General Electric let them use it so they

149
00:08:48,150 --> 00:08:41,800
ended up doing their first tests on

150
00:08:50,970 --> 00:08:48,160
Christmas Day in 1923 after the tests it

151
00:08:53,490 --> 00:08:50,980
is written here this is by Dryden

152
00:08:55,290 --> 00:08:53,500
himself he says we walked down the

153
00:08:58,410 --> 00:08:55,300
street in Lynn after the tests

154
00:09:01,050 --> 00:08:58,420
discussing the jet and noticed that

155
00:09:04,680 --> 00:09:01,060
passers-by were staring at us strangely

156
00:09:06,510 --> 00:09:04,690
and they were shaking their heads it was

157
00:09:07,560 --> 00:09:06,520
some time before we discovered that they

158
00:09:10,110 --> 00:09:07,570
we had been

159
00:09:12,510 --> 00:09:10,120
shouting at each other at the top of our

160
00:09:14,880 --> 00:09:12,520
voices we were both temporarily deaf as

161
00:09:18,560 --> 00:09:14,890
a result of working with our heads only

162
00:09:20,970 --> 00:09:18,570
a few inches from the large jet now the

163
00:09:25,250 --> 00:09:20,980

primarily thing I wanted to show here

164
00:09:29,300 --> 00:09:25,260
was the beginnings of the drag rise and

165
00:09:31,590 --> 00:09:29,310
this was done beginning Christmas Day

166
00:09:34,050 --> 00:09:31,600
1923 they showed the beginning of the

167
00:09:37,070 --> 00:09:34,060
drag rise for these various air these

168
00:09:39,300 --> 00:09:37,080
two airfoils at various angles of attack

169
00:09:42,780 --> 00:09:39,310
incidentally they didn't talk about Mach

170
00:09:45,900 --> 00:09:42,790
number they talked about velocity ratio

171
00:09:48,630 --> 00:09:45,910
and they didn't talk about transonic

172
00:09:52,880 --> 00:09:48,640
because there was no such word yet they

173
00:09:55,170 --> 00:09:52,890
talked about a different flow regime and

174
00:09:58,220 --> 00:09:55,180
once in a while they would say in their

175
00:10:06,210 --> 00:09:58,230
literature there seems to be a critical

176
00:10:11,340 --> 00:10:06,220
condition or a critical velocity it was

177
00:10:14,370 --> 00:10:11,350
two years later in 1926 I think that's

178
00:10:16,710 --> 00:10:14,380
when Milt was born that Briggs and

179
00:10:18,270 --> 00:10:16,720
Dryden his coworker in case I just

180
00:10:21,480 --> 00:10:18,280
showed you and Dryden devised an

181
00:10:23,580 --> 00:10:21,490
experiment to obtain pressure data in a

182
00:10:25,710 --> 00:10:23,590
pressure distribution form similar to

183
00:10:28,920 --> 00:10:25,720
what dr. Whitcomb use it and showed to

184
00:10:32,370 --> 00:10:28,930
us on the same airfoil shapes that they

185
00:10:35,010 --> 00:10:32,380
had tested on Christmas Day in 1923 they

186
00:10:38,040 --> 00:10:35,020
wanted to go supersonic this time so

187
00:10:40,740 --> 00:10:38,050
they devised the first convergent

188
00:10:43,220 --> 00:10:40,750

divergent test nozzle ever tested in the

189
00:10:48,390 --> 00:10:43,230
united states that actually provided

190
00:10:50,760 --> 00:10:48,400
quantitative or maybe dr. Dryden would

191
00:10:52,920 --> 00:10:50,770
say qualitative but I've seen the plots

192
00:10:59,720 --> 00:10:52,930
and it looks quantitative aerodynamic

193
00:11:03,270 --> 00:10:59,730
data this was a two-inch diameter nozzle

194
00:11:07,950 --> 00:11:03,280
and it was another open jet the cord of

195
00:11:14,090 --> 00:11:07,960
their air foils was one inch they tested

196
00:11:20,400 --> 00:11:17,910
it was a at this time incidentally as I

197
00:11:24,269 --> 00:11:20,410
indicated before there was no such word

198
00:11:26,160 --> 00:11:24,279
as trance and and dryden realized one

199
00:11:31,309 --> 00:11:26,170
was needed so he invented the word and

200
00:11:34,620 --> 00:11:31,319
it turned out to be transonic however

201
00:11:36,329 --> 00:11:34,630
I'm going to walk away from the mic here

202
00:11:39,600 --> 00:11:36,339
now so I can point it out a little

203
00:11:42,930 --> 00:11:39,610
better as you can see it those of you

204
00:11:45,590 --> 00:11:42,940
that are close enough it wasn't spelled

205
00:11:49,110 --> 00:11:45,600
the way we spell it today it has 2 s's

206
00:11:52,230 --> 00:11:49,120
they're here it's used again here it's

207
00:11:56,240 --> 00:11:52,240
used again these are excerpts from John

208
00:12:01,949 --> 00:11:56,250
stacks eights Wright brothers lecture of

209
00:12:04,439 --> 00:12:01,959
December 1944 these two instances of

210
00:12:07,110 --> 00:12:04,449
transonic spelled with 2 s's is from the

211
00:12:10,249 --> 00:12:07,120
body of John stacks lecture and then

212
00:12:13,379 --> 00:12:10,259
this case here is where dr. Dryden used

213
00:12:18,870 --> 00:12:13,389

transonic spell that way in his

214
00:12:21,660 --> 00:12:18,880
commentary on John stacks lecture dr.

215
00:12:25,199 --> 00:12:21,670
dragon was very logical his reasoning

216
00:12:26,999 --> 00:12:25,209
was like this transcontinental you take

217
00:12:29,990 --> 00:12:27,009
the word trance you take the word

218
00:12:36,569 --> 00:12:30,000
continental you push him together

219
00:12:42,179 --> 00:12:36,579
transoceanic why not transonic three

220
00:12:44,400 --> 00:12:42,189
years later dr. Dryden had left the

221
00:12:46,350 --> 00:12:44,410
bureau standards was in the process of

222
00:12:48,929 --> 00:12:46,360
leaving the Bureau standards and he was

223
00:12:51,689 --> 00:12:48,939
on a train ride with dr. pretend

224
00:12:54,990 --> 00:12:51,699
professor theodore von karman between

225
00:12:57,900 --> 00:12:55,000
Aberdeen Maryland and Washington DC and

226
00:13:02,009 --> 00:12:57,910
they were talking about the need for a

227
00:13:07,740 --> 00:13:02,019
word to describe this region now the

228
00:13:11,220 --> 00:13:07,750
case that I just showed you was in 1944

229
00:13:13,199 --> 00:13:11,230
this is three years later and Dryden

230
00:13:17,340 --> 00:13:13,209
said he had a word for it transonic

231
00:13:18,960 --> 00:13:17,350
spelled with 2 s's von karman liked the

232
00:13:22,650 --> 00:13:18,970
word but he didn't like the spelling and

233
00:13:24,079 --> 00:13:22,660
as you can see that's the way von karman

234
00:13:26,629 --> 00:13:24,089
wanted to spell it

235
00:13:29,829 --> 00:13:26,639
in spite of Dryden's reasonable thinking

236
00:13:34,999 --> 00:13:29,839
we all know which spelling has prevailed

237
00:13:37,819 --> 00:13:35,009
one carmen explains it this way he says

238
00:13:42,079 --> 00:13:37,829

Dryden was a logical and wanted two S's

239
00:13:44,660 --> 00:13:42,089
I thought it wasn't always necessary to

240
00:13:47,989 --> 00:13:44,670
be logical in aeronautics so I wrote it

241
00:13:53,030 --> 00:13:47,999
with one ass very simple in the course

242
00:13:56,480 --> 00:13:53,040
of their discussion or argument Dryden

243
00:13:59,889 --> 00:13:56,490
took a little convincing so finally dr.

244
00:14:03,429 --> 00:13:59,899
von karman quoted the German poet Goethe

245
00:14:07,910 --> 00:14:03,439
or at least he paraphrased him and said

246
00:14:12,949 --> 00:14:07,920
Getty says some logic is desirable but

247
00:14:16,579 --> 00:14:12,959
to always be logical is horrible so I

248
00:14:22,879 --> 00:14:16,589
guess Getty had to contend with nerds

249
00:14:24,860 --> 00:14:22,889
back in those days so this gives us a

250
00:14:27,259 --> 00:14:24,870
glimpse of the connection between Dryden

251
00:14:30,350 --> 00:14:27,269
a place and transonic we tested the

252
00:14:32,689 --> 00:14:30,360
first transonic airplane here and the

253
00:14:34,489 --> 00:14:32,699
place is now named Dryden we are the

254
00:14:37,400 --> 00:14:34,499
namesake and of course that was what

255
00:14:41,059 --> 00:14:37,410
Williams test group called narok flight

256
00:14:42,679 --> 00:14:41,069
test unit we've also established like a

257
00:14:44,749 --> 00:14:42,689
link between Dryden the man and

258
00:14:46,910 --> 00:14:44,759
transonic he generated the first

259
00:14:50,869 --> 00:14:46,920
experimental airfoil data demonstrating

260
00:14:53,989 --> 00:14:50,879
the critical drag rise he invented the

261
00:14:57,259 --> 00:14:53,999
word transonic and he with Briggs

262
00:15:00,939 --> 00:14:57,269
designed the first converging diverging

263
00:15:04,040 --> 00:15:00,949

test model nozzle that provided real

264
00:15:06,169 --> 00:15:04,050
aerodynamic data in this country it's

265
00:15:09,679 --> 00:15:06,179
interesting to note that their data with

266
00:15:12,319 --> 00:15:09,689
this converging diverging nozzle reached

267
00:15:17,509 --> 00:15:12,329
a peak Mount number one point 08 the

268
00:15:19,129 --> 00:15:17,519
first x1 air plane flight that exceeded

269
00:15:21,590 --> 00:15:19,139
the speed of sound went to one point 06

270
00:15:28,090 --> 00:15:21,600
only a two hundreds of a Mach number

271
00:15:33,910 --> 00:15:30,910
what about the man Wickham and transonic

272
00:15:36,069 --> 00:15:33,920
research well he dominated transonic

273
00:15:39,970 --> 00:15:36,079
aerodynamic research for at least three

274
00:15:42,220 --> 00:15:39,980
decades perhaps I should be corrected

275
00:15:47,230 --> 00:15:42,230
and it can be established that it was

276
00:15:50,439 --> 00:15:47,240
significantly longer than that he first

277
00:15:51,610 --> 00:15:50,449
the part that I know of he was an

278
00:15:55,920 --> 00:15:51,620
important part of the team that

279
00:16:03,970 --> 00:15:59,439
he invented and conceived of the area

280
00:16:06,999 --> 00:16:03,980
rule here we see the YF one or two on

281
00:16:10,199 --> 00:16:07,009
the left and a 102 a on the right which

282
00:16:13,900 --> 00:16:10,209
is the area ruled one in this case the

283
00:16:15,699 --> 00:16:13,910
wave drag increment was reduced about

284
00:16:20,590 --> 00:16:15,709
twenty-five percent by the area ruling

285
00:16:21,999 --> 00:16:20,600
process here in addition of course he

286
00:16:25,059 --> 00:16:22,009
invented and conceived of the

287
00:16:29,259 --> 00:16:25,069
supercritical wing that we're talking

288
00:16:31,120 --> 00:16:29,269

about today and in this case the drag

289
00:16:33,819 --> 00:16:31,130
rides Mach number of this configuration

290
00:16:36,639 --> 00:16:33,829
not the wing now but the configuration

291
00:16:39,819 --> 00:16:36,649
was pushed up to about point nine seven

292
00:16:42,460 --> 00:16:39,829
and this is a twerking lift coefficients

293
00:16:45,429 --> 00:16:42,470
this is a d'cruz lift coefficient and as

294
00:16:49,360 --> 00:16:45,439
he indicated earlier the drag rise Mach

295
00:16:53,980 --> 00:16:49,370
number of the wing itself was just

296
00:16:55,499 --> 00:16:53,990
nudging one in addition he invented and

297
00:17:00,670 --> 00:16:55,509
conceived of the winglets project

298
00:17:03,730 --> 00:17:00,680
winglets concept in this case the fuel

299
00:17:06,220 --> 00:17:03,740
savings were about six percent in later

300
00:17:07,929 --> 00:17:06,230
versions where the wing loading was

301
00:17:15,700 --> 00:17:07,939
higher near the tips of the savings

302
00:17:26,240 --> 00:17:21,860
now what kind of agency or technical

303
00:17:28,430 --> 00:17:26,250
organization can spawn if it indeed it

304
00:17:35,960 --> 00:17:28,440
did spawn I didn't want that how do i

305
00:17:39,590 --> 00:17:35,970
cancel it spawn or nurture such an

306
00:17:41,060 --> 00:17:39,600
innovative research I like to think it's

307
00:17:45,050 --> 00:17:41,070
an organization that can challenge

308
00:17:48,110 --> 00:17:45,060
conventional wisdom conventional wisdom

309
00:17:51,560 --> 00:17:48,120
is all right if it's considered for what

310
00:17:55,640 --> 00:17:51,570
it really is it's a reasonable starting

311
00:17:57,050 --> 00:17:55,650
place but a habitual reliance on

312
00:17:59,410 --> 00:17:57,060
conventional wisdom leaves you

313
00:18:03,220 --> 00:17:59,420

relatively close to the starting place

314
00:18:06,920 --> 00:18:03,230
it increases the odds for the status quo

315
00:18:09,200 --> 00:18:06,930
that's why it's encouraging for me to

316
00:18:11,560 --> 00:18:09,210
see one of the things that our new

317
00:18:15,920 --> 00:18:11,570
administrator said in a recent address

318
00:18:18,470 --> 00:18:15,930
which i already showed you where he said

319
00:18:20,540 --> 00:18:18,480
in the new NASA will welcome a diversity

320
00:18:24,290 --> 00:18:20,550
of views and ideas from both inside and

321
00:18:27,760 --> 00:18:24,300
outside the organization and perhaps the

322
00:18:31,790 --> 00:18:27,770
words of retiring deputy administrator

323
00:18:34,400 --> 00:18:31,800
James Thompson that he wrote in the

324
00:18:36,050 --> 00:18:34,410
winter issue of the NASA magazine were

325
00:18:40,820 --> 00:18:36,060
intended to challenge conventional

326
00:18:43,040 --> 00:18:40,830
wisdom when he wrote I think sometimes

327
00:18:47,600 --> 00:18:43,050
NASA could use a little more internal

328
00:18:50,060 --> 00:18:47,610
controversy concern about conventional

329
00:18:54,320 --> 00:18:50,070
wisdom isn't limited only to the

330
00:18:55,940 --> 00:18:54,330
technical community for example here are

331
00:19:01,730 --> 00:18:55,950
the paraphrase words of a noted

332
00:19:04,790 --> 00:19:01,740
twentieth century theologian if you and

333
00:19:09,980 --> 00:19:04,800
I agree on every matter one of us has

334
00:19:13,900 --> 00:19:09,990
ceased thinking and perhaps dr. jb

335
00:19:18,800 --> 00:19:13,910
Harvey has said it as well as anyone

336
00:19:21,890 --> 00:19:18,810
this mismanagement of agreement not the

337
00:19:23,450 --> 00:19:21,900
inability to manage conflict is a single

338
00:19:25,160 --> 00:19:23,460

most pressing issue of most modern

339
00:19:31,340 --> 00:19:25,170
organizations

340
00:19:35,870 --> 00:19:31,350
I wander is a spirit conveyed by these

341
00:19:38,260 --> 00:19:35,880
four individuals seemingly expressing

342
00:19:40,190 --> 00:19:38,270
concern about conventional wisdom

343
00:19:42,290 --> 00:19:40,200
representative of the environment that

344
00:19:44,090 --> 00:19:42,300
dr. Wickham worked within during the

345
00:19:48,980 --> 00:19:44,100
years that he dominated the field of

346
00:19:51,770 --> 00:19:48,990
experimental transonic aerodynamics did

347
00:19:53,300 --> 00:19:51,780
his revolutionary ideas thrive because

348
00:19:57,110 --> 00:19:53,310
he worked in an environment that was

349
00:20:04,670 --> 00:19:57,120
unencumbered by conventional wisdom not

350
00:20:06,650 --> 00:20:04,680
quite as obvious as the need was for a

351
00:20:10,480 --> 00:20:06,660
revolutionary breakthrough in reducing

352
00:20:13,160 --> 00:20:10,490
the transonic wave drag there were a few

353
00:20:16,420 --> 00:20:13,170
who said that the benefits from the area

354
00:20:20,930 --> 00:20:16,430
rule were largely finest ratio effects

355
00:20:22,520 --> 00:20:20,940
and there was conventional wisdom which

356
00:20:24,380 --> 00:20:22,530
claimed that the benefits from the

357
00:20:28,190 --> 00:20:24,390
reduced shock strength provided by the

358
00:20:31,400 --> 00:20:28,200
supercritical airfoil would likely be

359
00:20:37,490 --> 00:20:31,410
overshadowed canceled out by high trim

360
00:20:39,920 --> 00:20:37,500
drag and some conventional conventional

361
00:20:42,680 --> 00:20:39,930
wisdom adherence thought that the

362
00:20:49,000 --> 00:20:42,690
winglets were simply extra aspect ratio

363
00:20:55,630 --> 00:20:53,220

they were wrong in every case the

364
00:21:00,070 --> 00:20:55,640
original wind tunnel research work at

365
00:21:02,620 --> 00:21:00,080
Langley added to the confirmation flight

366
00:21:05,740 --> 00:21:02,630
data that was obtained out here at

367
00:21:07,990 --> 00:21:05,750
Dryden and the numerous numerous

368
00:21:10,420 --> 00:21:08,000
commercial and military applications of

369
00:21:15,040 --> 00:21:10,430
these three technologies have

370
00:21:18,250 --> 00:21:15,050
discredited conventional wisdom so the

371
00:21:20,170 --> 00:21:18,260
score is innovative radical transonic

372
00:21:23,530 --> 00:21:20,180
research that's how I like to describe

373
00:21:28,780 --> 00:21:23,540
what he did three conventional wisdom

374
00:21:33,610 --> 00:21:28,790
zero we should remember this score as we

375
00:21:37,500 --> 00:21:33,620
continue toward nasp and the external

376
00:21:40,330 --> 00:21:37,510
burning experiment and follow-on

377
00:21:47,980 --> 00:21:40,340
supersonic and hypersonic vehicles after

378
00:21:52,570 --> 00:21:47,990
that hypersonic vehicles must still pass

379
00:21:54,550 --> 00:21:52,580
through the transonic toll gate there's

380
00:21:58,090 --> 00:21:54,560
a toll extracted every time you pass

381
00:21:59,800 --> 00:21:58,100
through and dr. Wickham is his research

382
00:22:02,080 --> 00:21:59,810
has shown that the cost of the gate can

383
00:22:07,930 --> 00:22:02,090
be lowered by innovative experimental

384
00:22:11,560 --> 00:22:07,940
work and amazingly enough even if there

385
00:22:21,740 --> 00:22:11,570
is not a red team or a blue team in

386
00:22:29,880 --> 00:22:26,669
we have a recent example by the way that

387
00:22:31,830 --> 00:22:29,890
I think reflects the encroachment of

388
00:22:33,029 --> 00:22:31,840

conventional wisdom in the case of some

389
00:22:35,970 --> 00:22:33,039
of the airplanes that flew in the Gulf

390
00:22:38,580 --> 00:22:35,980
War some of the data I have looked at

391
00:22:41,220 --> 00:22:38,590
and now this would be lift and drag data

392
00:22:45,000 --> 00:22:41,230
of contemporary high-performance

393
00:22:48,320 --> 00:22:45,010
aircraft using the war shall reveal an

394
00:22:52,769 --> 00:22:48,330
erosion of aero design finesse a

395
00:22:55,409 --> 00:22:52,779
slippage of aero design discipline by

396
00:22:58,139 --> 00:22:55,419
discipline I mean no sticking to the

397
00:23:03,090 --> 00:22:58,149
principles compared to aircraft designed

398
00:23:05,750 --> 00:23:03,100
and built in the 50s and 60s to be more

399
00:23:08,970 --> 00:23:05,760
specific the way drag is too high and

400
00:23:12,510 --> 00:23:08,980
parasite drag is too high compared to

401
00:23:15,000 --> 00:23:12,520
those earlier airplanes this indicates

402
00:23:19,260 --> 00:23:15,010
to me the conventional wisdom does not

403
00:23:22,560 --> 00:23:19,270
go away or become old-fashioned every

404
00:23:24,389 --> 00:23:22,570
generation has its own form in fact it

405
00:23:27,779 --> 00:23:24,399
seems to me like it's almost like

406
00:23:30,029 --> 00:23:27,789
chicken pox or measles or mumps that

407
00:23:33,750 --> 00:23:30,039
every generation has its cases of

408
00:23:35,610 --> 00:23:33,760
conventional wisdom just because each

409
00:23:40,549 --> 00:23:35,620
generation thinks it's more enlightened

410
00:23:45,450 --> 00:23:40,559
it just doesn't work that way further

411
00:23:47,930 --> 00:23:45,460
just because this airplane that was

412
00:23:50,760 --> 00:23:47,940
dedicated today one of the two an

413
00:23:54,389 --> 00:23:50,770

important transonic research facility

414
00:23:59,639 --> 00:23:54,399
has been retired maybe some of you will

415
00:24:03,029 --> 00:23:59,649
think of it as a museum piece and I

416
00:24:05,700 --> 00:24:03,039
guess it is and it also represents

417
00:24:09,029 --> 00:24:05,710
history and transonic research has a

418
00:24:12,659 --> 00:24:09,039
history nevertheless we should not think

419
00:24:16,440 --> 00:24:12,669
of transonic research in historical

420
00:24:19,049 --> 00:24:16,450
terms transonic problems are still with

421
00:24:21,450 --> 00:24:19,059
us the brilliant transonic innovations

422
00:24:24,269 --> 00:24:21,460
of the 50s and 60s did not revoke the

423
00:24:28,139 --> 00:24:24,279
laws of physics concerning transonic

424
00:24:30,510 --> 00:24:28,149
flow for future generations it is my

425
00:24:32,409 --> 00:24:30,520
hope that the supercritical wing

426
00:24:35,590 --> 00:24:32,419
research airplane

427
00:24:38,580 --> 00:24:35,600
when I walk by it out there and when

428
00:24:43,109 --> 00:24:38,590
other people walk by it is my hope that

429
00:24:45,609 --> 00:24:43,119
it will be representative of the

430
00:24:48,909 --> 00:24:45,619
innovative transonic work of the past

431
00:24:51,099 --> 00:24:48,919
but in addition it should remind us that

432
00:24:55,029 --> 00:24:51,109
if we limit transonic research to the

433
00:24:57,279 --> 00:24:55,039
past and only consider it history the

434
00:25:01,060 --> 00:24:57,289
charges at the toll gate the transonic

435
00:25:03,239 --> 00:25:01,070
toll gate will be unnecessarily high for

436
00:25:08,349 --> 00:25:03,249
some future supersonic and hypersonic

437
00:25:10,840 --> 00:25:08,359
airplanes this would be a good place I

438
00:25:15,820 --> 00:25:10,850

think to go back to dr. Dryden and

439
00:25:18,810 --> 00:25:15,830
indicate what he said quote the most

440
00:25:23,409 --> 00:25:18,820
important tool in aeronautical research

441
00:25:26,940 --> 00:25:23,419
comma even more than the large wooden

442
00:25:31,450 --> 00:25:26,950
tunnel comma and then I'd like to add

443
00:25:34,599 --> 00:25:31,460
this goes for airplanes to is the human

444
00:25:37,320 --> 00:25:34,609
mind the most important tool for

445
00:25:41,529 --> 00:25:37,330
aeronautical research is the human mind

446
00:25:43,659 --> 00:25:41,539
credit that to dr. Crichton this is the

447
00:25:45,999 --> 00:25:43,669
end of my perspective on this if you

448
00:25:50,739 --> 00:25:46,009
call it a wrap up I want to now

449
00:25:54,549 --> 00:25:50,749
acknowledge team members both at Langley

450
00:25:55,869 --> 00:25:54,559
and here in closing it's appropriate to

451
00:25:58,899 --> 00:25:55,879
mention some of the team members who

452
00:26:03,779 --> 00:25:58,909
worked with dr. Wickham Tom Kelly Perry

453
00:26:06,129 --> 00:26:03,789
Hanson Dennis Bartlett James blackwell

454
00:26:09,460 --> 00:26:06,139
he's introduced as Mickey today that's

455
00:26:12,430 --> 00:26:09,470
what he goes by I understand Larry

456
00:26:15,899 --> 00:26:12,440
Lofton in an administrative capacity and

457
00:26:20,109 --> 00:26:15,909
out here d dealer in an administrative

458
00:26:22,840 --> 00:26:20,119
capacity Ted errors though he didn't

459
00:26:24,849 --> 00:26:22,850
work on their plane that was dedicated

460
00:26:26,820 --> 00:26:24,859
today was a team member on the

461
00:26:30,430 --> 00:26:26,830
supercritical wing crew back at Langley

462
00:26:34,450 --> 00:26:30,440
as you've already heard working with dr.

463
00:26:37,720 --> 00:26:34,460

Wickham he worked primarily on the lower

464
00:26:40,539 --> 00:26:37,730
aspect ratio of tact application his

465
00:26:43,239 --> 00:26:40,549
transfer dryden significantly raised our

466
00:26:45,010 --> 00:26:43,249
transonic and supercritical experience

467
00:26:48,150 --> 00:26:45,020
and knowledge out here

468
00:26:50,530 --> 00:26:48,160
as for the Dryden test research team I

469
00:26:57,310 --> 00:26:50,540
want to recognize them in this closing

470
00:27:00,280 --> 00:26:57,320
slide and we already know that we don't

471
00:27:02,530 --> 00:27:00,290
have all the names on their loose tears

472
00:27:04,360 --> 00:27:02,540
for example should be on there and he

473
00:27:08,500 --> 00:27:04,370
isn't and I thought of another and I

474
00:27:15,580 --> 00:27:08,510
don't believe John Kerry is what we're

475
00:27:19,060 --> 00:27:15,590
going to do after cancel a finishes is

476
00:27:20,680 --> 00:27:19,070
put this back up again along with a view

477
00:27:24,070 --> 00:27:20,690
graph which shows the digital

478
00:27:27,910 --> 00:27:24,080
fly-by-wire team members and then we'll

479
00:27:29,650 --> 00:27:27,920
ask people out in the audience that that

480
00:27:34,600 --> 00:27:29,660
know that there are names missing to

481
00:27:39,400 --> 00:27:34,610
come up and write them on this tablet

482
00:27:42,300 --> 00:27:39,410
please so we'll blank this out now and