

Airline Industry On-Time Performance Analysis

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Introduction

Point B's client, a major air carrier based in Seattle, has engaged us to analyze industry on-time performance and help them understand competitive trends in the markets in which they operate.

Data

The analysis is based on data set containing detailed on-time flight performance data for every scheduled airline flight from 2006-2015, produced by the U.S. Department of Transportation.

The raw data are available in an Amazon Redshift database environment.

Analysis

The data have been analyzed to explore on-time performance of flights in the United States by geographic location and aircraft manufacturer.

The first step in exploring the on-time flight data was to find out how many flights are represented in the database. Table 1 shows the number of flights by carrier and year.

Table 1: Number of flights per year by airline

Airline	Year										
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
ATA Airlines: TZ	19602	0	0	0	0	0	0	0	0	0	0
AirTran Airways: FL	237645	263159	261684	251415	38383	248703	218162	173952	79495	0	0
Alaska Airlines: AS	159404	160185	151102	137322	20099	143726	147569	154743	160257	172521	134731
Aloha Airlines: AQ	35387	46360	7800	0	0	0	0	0	0	0	0
American Airlines: AA	643597	633857	604885	551597	88874	538179	525220	537891	537697	725984	693703
Comair: OH (1)	278099	236032	197607	151774	21790	0	0	0	0	0	0
Continental Air Lines: CO	309389	323151	298455	258159	38089	245318	0	0	0	0	0
Delta Air Lines: DL	506086	475889	451931	428007	109918	732331	726879	754670	800375	875881	698064
Endeavor Air: 9E	0	258851	262208	262973	42279	0	0	296701	0	0	0
Envoy Air: MQ	550088	540494	490693	437009	70062	448178	473140	439865	392701	294632	0
ExpressJet Airlines (1): XE	441470	434773	374510	310717	54493	413286	0	0	0	0	0
ExpressJet Airlines: EV	273143	286234	280575	299000	47690	327845	740855	748696	686021	571977	377333
Frontier Airlines: F9	90181	97760	95762	86989	12602	85485	79255	75612	85474	90836	70550
Hawaiian Airlines: HA	52173	56175	61826	72920	10828	66740	74109	72286	74732	76272	58136
JetBlue Airways: B6	155732	191450	196091	194336	31553	215970	229056	241777	249693	267048	211942
Mesa Airlines: YV	304764	294362	254930	244128	33986	156297	133976	140922	0	0	0
Northwest Airlines: NW	432880	414526	347652	293133	0	0	0	0	0	0	0
SkyWest Airlines: OO	548109	597880	567157	547572	93663	587372	617756	626359	613030	588353	458004
Southwest Airlines: WN	1099321	1168871	1201754	1132278	172612	1155717	1140535	1130704	1174633	1261855	973436
Spirit Air Lines: NK	0	0	0	0	0	0	0	0	0	117379	102663
US Airways: US	504844	485447	453589	413907	64323	408922	404263	412373	414665	198715	0
United Air Lines: UA	500008	490002	449515	377049	53835	311212	531245	505798	493528	515723	403316
Virgin America: VX	0	0	0	0	0	0	54742	57133	57510	61903	51267

Next, the on-time performance of the different aircraft manufacturers included in the database is evaluated monthly for 2015. Table 2 provides the on-time percentage for each month in 2015 for each aircraft manufacturer. The average on-time percentage across all manufactures is also included in the table. Table 3 shows the difference in on-time percentage between each manufacturer and the average.

Table 2: Percent flights departing on time by manufacturer, 2015

Manufacturer	Month of 2015											
	1	2	3	4	5	6	7	8	9	10	11	12
Average	79.3	78.9	79.2	80.9	80.7	74.9	75.6	78.7	76.8	86.1	85.6	79.3
AGUSTA SPA	72.7	79.0	61.5	65.0	70.0	-	50.0	52.4	75.0	92.3	81.3	75.0
AIRBUS	79.7	73.7	78.2	82.2	80.1	75.2	77.9	76.7	84.7	84.5	83.8	75.1
AIRBUS HELICOPTERS	74.4	72.3	80.7	80.0	76.5	79.4	80.0	78.2	84.3	78.2	83.5	90.0
AIRBUS INDUSTRIE	82.8	78.1	83.2	84.8	84.7	78.7	81.6	83.1	88.5	88.8	87.3	80.8
BEECH	87.2	74.3	80.4	86.7	82.3	77.9	82.7	87.7	91.6	86.4	85.5	79.6
BELL	81.6	73.7	80.0	82.7	-	-	-	-	-	-	-	-
BELL HELICOPTER TEXTRON INC	-	-	-	-	-	-	-	-	69.6	80.2	85.5	
BOEING	80.6	78.9	80.1	82.7	80.3	74.5	75.6	79.7	87.5	87.5	84.4	78.0
BOMBARDIER INC	79.3	78.3	83.2	85.4	84.3	80.0	81.7	82.6	87.6	87.6	85.0	79.5
CANADAIR	74.1	77.9	83.8	82.6	83.5	81.5	80.0	82.6	87.7	85.7	90.6	78.4
CESSNA	74.8	74.9	83.0	76.1	79.2	74.8	78.9	73.1	84.6	83.9	82.4	78.3
CHRISTEN INDUSTRIES INC	100.0	50.0	50.0	62.5	69.2	63.6	100.0	0.0	83.3	85.0	92.3	
CIRRUS DESIGN CORP	77.3	72.4	76.4	80.7	85.8	83.2	74.2	73.0	75.0	84.8	79.0	74.4
CROZIER	-	-	-	-	-	-	-	-	-	-	-	75.0
DASSAULT	-	-	-	-	-	75.0	90.8	78.7	97.4	90.0	86.5	75.0
DIAMOND AIRCRAFT IND INC	73.3	91.0	87.4	-	-	-	-	-	86.4	88.9	77.1	
DOUGLAS	84.8	80.0	82.0	84.5	84.0	79.1	82.3	84.1	90.1	90.4	87.7	83.0
EMBRAER-EMPRESA BRASILEIRA DE	81.0	77.3	82.6	85.5	82.5	76.5	82.4	83.6	88.4	87.4	85.9	80.7
FARMAN OHTM	76.2	79.3	76.1	83.7	82.0	74.0	80.1	77.9	83.2	88.5	84.0	77.1
GULFSTREAM AEROSPACE	85.5	73.8	81.9	86.1	83.2	76.3	84.8	77.4	86.1	86.0	88.3	84.1
LEARJET INC	79.0	81.3	78.7	80.0	85.2	79.7	91.9	91.1	83.1	85.9	93.0	79.3
PIPER/MICHMERHUIZEN P J	81.4	79.0	80.1	83.1	85.4	83.4	80.5	82.2	86.4	86.9	85.4	79.3
RAYTHEON AIRCRAFT COMPANY	-	-	-	-	-	-	-	-	-	-	85.3	79.3
ROBINSON HELI/NEWSOME L	80.8	76.5	73.4	85.3	85.9	78.9	59.8	69.8	75.2	89.6	76.2	68.6
SIKORSKY	-	84.6	100.0	91.7	76.2	25.0	33.3	61.1	0.0	90.0	100.0	78.6

Table 3: On-time flight departure delta from average (% on-time - Avg % on-time), 2015

Manufacturer	Month of 2015											
	1	2	3	4	5	6	7	8	9	10	11	12
Average	79.3	78.9	79.2	80.9	80.7	74.9	75.6	78.7	76.8	86.1	85.6	79.3
AGUSTA SPA	-6.6	0.1	-17.6	-15.9	-10.7	-	-25.6	-26.4	-1.8	6.2	-4.4	-4.3
AIRBUS	0.4	-5.1	-1.0	1.3	-0.6	0.4	2.3	-2.0	7.9	-1.6	-1.9	-4.2
AIRBUS HELICOPTERS	-4.9	-6.6	1.5	-0.9	-4.2	4.6	4.4	-0.6	7.5	-7.9	-2.1	10.7
AIRBUS INDUSTRIE	3.5	-0.7	4.0	3.9	4.0	3.8	6.0	4.3	11.7	2.8	1.7	1.5
BEECH	7.9	-4.6	1.2	5.8	1.6	3.0	7.1	8.9	14.8	0.3	-0.1	0.3
BELL	2.3	-5.1	0.8	1.7	-	-	-	-	-	-	-	-
BELL HELICOPTER TEXTRON INC	-	-	-	-	-	-	-	-	-	-16.5	-5.4	6.1
BOEING	1.3	0.0	0.9	1.7	-0.5	-0.4	-0.1	1.0	10.7	1.4	-1.3	-1.3
BOMBARDIER INC	0.0	-0.6	4.1	4.4	3.6	5.2	6.1	3.8	10.8	1.5	-0.7	0.2
CANADAIR	-5.2	-1.0	4.6	1.6	2.8	6.7	4.4	3.8	10.9	-0.4	5.0	-1.0
CESSNA	-4.5	-4.0	3.9	-4.9	-1.5	-0.1	3.3	-5.7	7.8	-2.1	-3.2	-1.1
CHRISTEN INDUSTRIES INC	-79.3	21.1	-29.2	-30.9	-18.2	-5.6	-12.0	21.3	-76.8	-2.8	-0.6	13.0
CIRRUS DESIGN CORP	-2.0	-6.5	-2.8	-0.3	5.1	8.4	-1.4	-5.7	-1.8	-1.3	-6.6	-4.9
CROZIER	-	-	-	-	-	-	-	-	-	-	-	-4.3
DASSAULT	-	-	-	-	-	0.1	15.2	0.0	20.6	3.9	0.9	-4.3
DIAMOND AIRCRAFT IND INC	-6.0	12.1	8.2	-	-	-	-	-	-	0.3	3.3	-2.3
DOUGLAS	5.5	1.1	2.8	3.6	3.3	4.2	6.7	5.4	13.3	4.3	2.1	3.7
EMBRAER-EMPRESA BRASILEIRA DE	1.7	-1.6	3.4	4.6	1.8	1.7	6.7	4.9	11.6	1.3	0.3	1.4
FARMAN OHTM	-3.1	0.4	-3.1	2.7	1.3	-0.8	4.5	-0.9	6.4	2.4	-1.6	-2.2
GULFSTREAM AEROSPACE	6.2	-5.1	2.8	5.2	2.4	1.4	9.1	-1.3	9.2	-0.1	2.7	4.8
LEARJET INC	-0.3	2.4	-0.5	-0.9	4.5	4.8	16.3	12.3	6.2	-0.1	7.4	-0.1
PIPER/MICHMERHUIZEN P J	2.1	0.1	1.0	2.1	4.7	8.6	4.9	3.4	9.6	0.8	-0.2	0.0
RAYTHEON AIRCRAFT COMPANY	-	-	-	-	-	-	-	-	-	-	-0.3	0.0
ROBINSON HELI/NEWSOME L	1.5	-2.3	-5.8	4.4	5.1	4.0	-15.8	-8.9	-1.6	3.5	-9.4	-10.8
SIKORSKY	-	5.8	20.8	10.7	-4.5	-49.9	-42.3	-17.6	-76.8	3.9	14.4	-0.8

Airports are plotted on a map of North America to indicate where the geographical “hot-spots” are for on-time performance. In the following figures, areas with the best on-time performance are displayed using larger markers while the airports that perform poorly in on-time departures are depicted using smaller markers.

These images show that Hawaii and much of the West, including the Pacific Northwest and Rocky Mountain regions tend to consistently strong performers in on-time performance.



Figure 1: Strength of on-time performance and airports in North America, 2006-2007



Figure 2: Strength of on-time performance and airports in North America, 2008-2009



Figure 3: Strength of on-time performance and airports in North America, 2010-2011



Figure 4: Strength of on-time performance and airports in North America, 2012-2013



Figure 5: Strength of on-time performance and airports in North America, 2014-2015

The percent change in on-time performance from 2006 to 2015 is shown in Figure 6. Areas that have improved by more than 5% are shown in green while airports that have lost more than 5% in on-time performance are plotted in red. Everything in between is represented in yellow. Note that Alaska and the Southeastern United States have been improving over time.

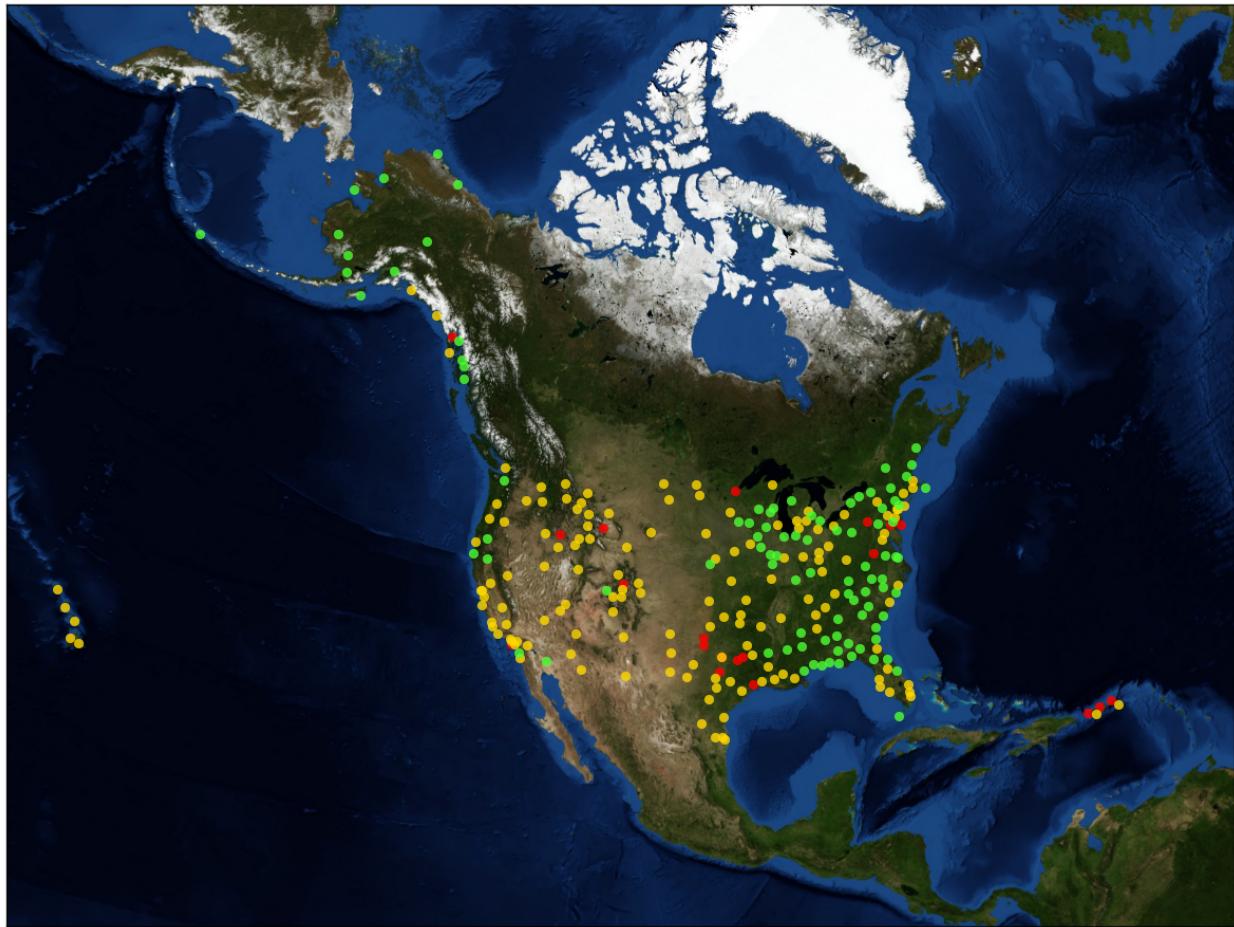


Figure 6: Improvement in on-time performance between 2006 and 2016 by airport

Figure 7 compares the Sea-Tac Airport's on-time performance during the 2006 - 2015 period against the national average. Sea-Tac's performance is below average in 2006 and 2007, and then improves markedly between 2007 and 2010, remaining above the national average on-time performance thereafter. It's important to note that Sea-Tac added a third runway in late 2008. This may be one of the reasons for Seattle's transition from being a below-average performer to a consistently strong airport for on-time departures.

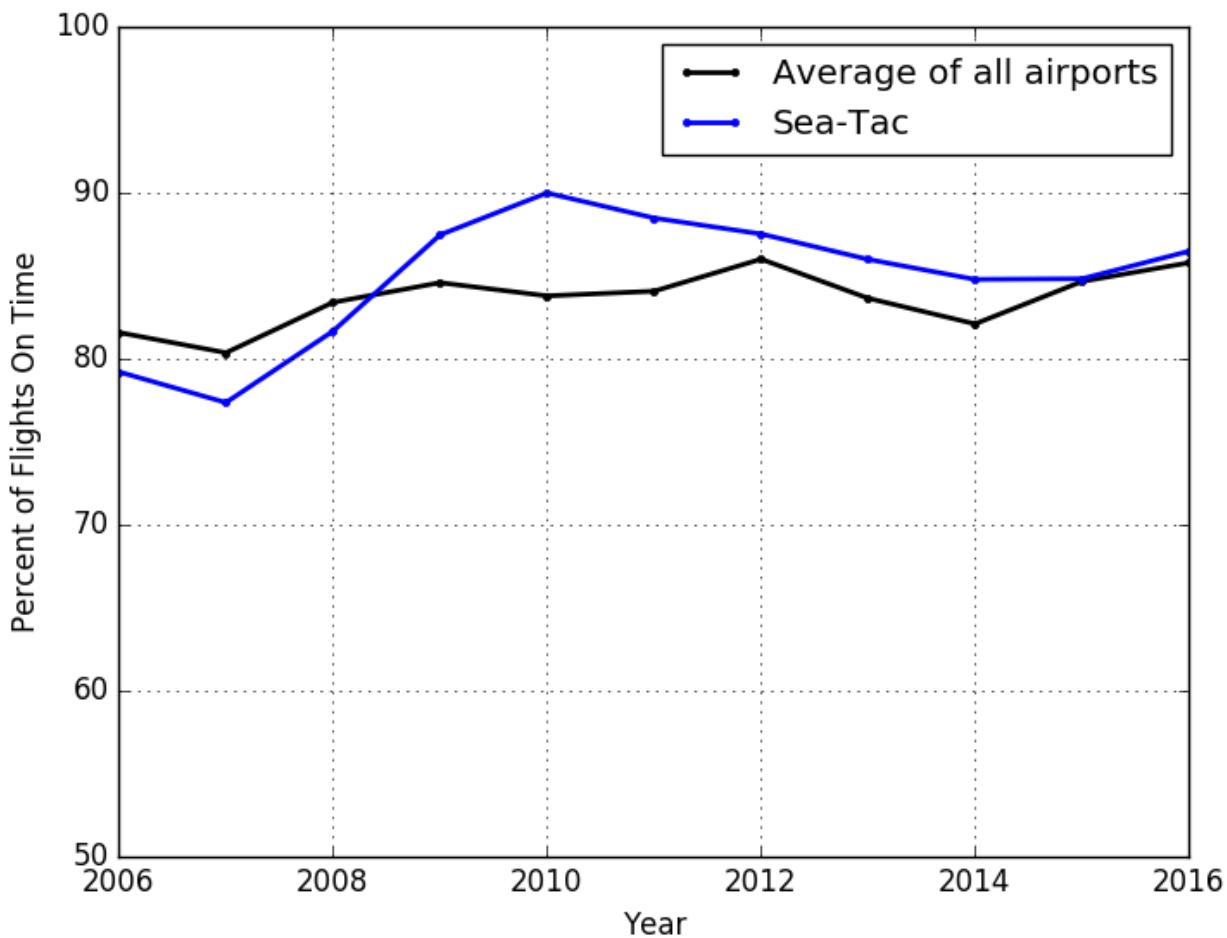


Figure 7: On-time performance comparison between Sea-Tac Airport and national average