

AIRLINE AIRCRAFT MANUFACTURERS

John F. Walsh
Rohr Industries

The deliberations of this panel were directed at developing a 15-year forecast (1989-2003) of aircraft deliveries for the commercial jet transport market. Traffic growth and load factor projections as well as a forecast of retirement of existing aircraft from the world's passenger fleet were also part of the forecasting effort. A rating system was used to develop a consensus on the issues the panel considered the most difficult to forecast and those that would have the most significant impact in the forecast period.

The manufacturing panel consisted of representatives from the following companies: Aeritalia, Fokker, Airbus Industries, General Electric, Allied Signal, Honeywell, Boeing, IAE, British Aerospace, Pratt & Whitney, Douglas Aircraft, Rohr Industries, and Rolls-Royce.

The participants were asked to submit their forecasts in advance, and the results were analyzed during the workshop meeting. Each participant provided a brief presentation in those areas of the forecast in which there were divergent views from the group average. Adjustments were made to the consensus forecast based on insights obtained during these presentations.

Traffic Growth and Load Factors

The results of the traffic projections developed by the panel for the 15-year forecast period are shown in Table 1. There was fairly wide range of growth projections as indicated by the high and low values in the table.

The average traffic growth assumptions for the three five-year period periods within the forecast's horizon are shown in Table 2. The data indicate gradual reduction in the rate of growth towards the later periods as both the U.S. and non-U.S. markets become more mature. The increases in load factors were generally believed to develop as result of more

TABLE 1. TRAFFIC GROWTH ASSUMPTIONS, 1989-2003

<u>AVERAGE ANNUAL GROWTH OF REVENUE PASSENGER MILES¹</u>	<u>LOW</u>	<u>AVERAGE</u>	<u>HIGH</u>
U.S.	3.4%	4.4%	5.1%
Non-U.S. ²	4.9%	5.7%	6.8%
World Total	4.3%	5.1%	5.8%
<u>WORLD LOAD FACTOR</u>	65.4%	65.8%	67.9%

1. Scheduled & unscheduled revenue passenger miles

2. Excludes USSR but includes Peoples Republic of China and Taiwan

TABLE 2. TRAFFIC GROWTH ASSUMPTIONS, 1989-2003
AVERAGE BY 5-YEAR PERIODS

<u>AVERAGE ANNUAL GROWTH IN REVENUE PASSENGER MILES¹</u>	<u>(1989-1993)</u>	<u>(1994-1998)</u>	<u>(1999-2003)</u>
U.S.	4.8%	4.7%	3.9%
Non-U.S. ²	6.7%	5.9%	5.2%
World Total	5.8%	5.2%	4.6%
<u>WORLD LOAD FACTOR</u>	65.1%	65.7%	66.6%

1. Scheduled & unscheduled revenue passenger miles

2. Excludes USSR but includes Peoples Republic of China and Taiwan

efficient scheduling and yield management systems during the forecast period.

Passenger Aircraft Deliveries

To develop a consistent set of assumptions for the deliveries and retirement forecast, a matrix was developed to classify aircraft types into three categories. (See Table 3.)

The panel's average forecast for aircraft deliveries in the 15-year period together with the high and low values are in shown in Table 4.

There was considerable discussion about whether the current high order and delivery rate of the Class I aircraft (short/medium range aircraft with less than 120 seats) would continue during the forecast period.

A number of panel members believed that future deliveries of Class I aircraft would be significantly reduced because of the saturation in the number of hub-and-spoke systems within the U.S. and that a move to a larger aircraft to satisfy limited slot availability at the existing hubs would result. The smaller aircraft advocates on the panel saw the development of secondary hubs and more direct point-to-point flights to provide added growth without constraining airport and airway capacities.

There was a mix of cyclical and noncyclical forecasts which significantly affected the average annual values listed in Table 5. Most of the cyclical forecasts showed the industry reaching a peak in the 1990-1991 time period with deliveries in the 700-900 aircraft range. The subsequent decline in these cyclical forecasts indicate a low spot in the 1993-1994 time period in the 400-500 aircraft range.

TABLE 3. DEFINITION OF AIRCRAFT CLASSIFICATIONS FORECASTS

	CLASS I SHORT/MEDIUM RANGE A/C (< 120 SEATS)	CLASS II SHORT/MEDIUM RANGE A/C (120 TO 350+ SEATS)	CLASS III LONG RANGE A/C (150+ SEATS)
OUT OF PRODUCTION AIRCRAFT (FOR RETIREMENT FORECAST)	* CARAVELLE * DC9 * 727-100 * F-28 * 737-100/200 * CONVAIR 880 * BAC 1-11 * TRIDENT 1/2	* A300 B2/B4 * DC8-61 * 707-120/220 * DC10-10/15 * 720 * MERCURE * 727-200 * TRIDENT 3 * DC8-10/20 * L1011-1	* CONCORDE * DC8-30/40/50 * VC10 * DC8-62/63 * COMET * DC10-30/40 * 707-320/420 * CONVAIR 990 * 747 SP * L1011-100/-200/-500
CURRENT/FUTURE AIRCRAFT (FOR DELIVERY & RETIREMENT FORECAST)	* 737-500 * MD-87 * MD-91 * BAE 146 * FOKKER 100	* A300-600 * 757 * A310-200 * 767-100/ -200/-300 * A320 * A321-100 * 767-X * A330 * MD-80s * 737-300/400 * MD-92 * 747 SR	* A310-300 * 747-200/ -300/-400 * A330ER * 767-200ER * A340 * 767-300ER * A340 STRETCH * MD-11 * MD-11/STRETCH

TABLE 4. NEW PASSENGER AIRCRAFT DELIVERIES BY CLASS, 1989-2003¹

	ESTIMATED TOTAL DELIVERIES ²		
	Low	Average	High
CLASS I ³	874	1,263	2,056
CLASS II	3,972	5,175	6,748
CLASS III	891	1,643	2,121

TABLE 5. NEW PASSENGER AIRCRAFT AVERAGE ANNUAL DELIVERIES, 1989-2003^{1,2}

1989	576	1996	510
1990	639	1997	518
1991	656	1998	509
1992	602	1999	523
1993	566	2000	505
1994	529	2001	507
1995	523	2002	498
1996	510	2003	498
		15-YEAR TOTAL	8,081

1. Deliveries to commercial transport airlines excluding pure freight/and cargo applications
 2. Excludes USSR but includes Peoples Republic of China and Taiwan
 3. Classes as defined in Table 3.

Passenger Aircraft Retirements

The results of the panel's forecast for retirement aircraft from the world passenger aircraft fleet by class of aircraft are shown in Table 6. Class I aircraft (short/medium range aircraft with less than 120 seats) have the highest average level of aircraft retirements and are the only class in which aircraft retirements are expected to exceed deliveries for the 15-year forecast period.

Assumptions for the timing for potential Stage 3 noise legislation and aging aircraft concerns cause considerable variation in the annual retirement levels contained in Table 7. Most of the cyclical forecasts indicate a peak in the aircraft retirements in 1992-1993 time period with a range of 250-400 aircraft in each of these years.

There was general agreement within the panel that the forecast of aircraft retirements was the most challenging element of the forecast process. Most analytical models being used by this panel indicate projected retirements of aircraft in the 200-250 aircraft range for the 1987-1990 period. Results for 1987-1988 indicate actual retirements of fewer than 75 aircraft in each of these years. The actual retirements for 1989 are now estimated to be within the range of 75-100 aircraft.

There was a general consensus that potential Stage 3 noise legislation would be established for noise-sensitive airports on a worldwide basis with a deadline somewhere between 2000 and 2005 and a gradual phase-in starting in the 1995-2000 period.

TABLE 6. PASSENGER AIRCRAFT RETIREMENTS BY CLASS, 1989-2003¹

	<u>ESTIMATED RETIREMENTS²</u>		
	<u>Low</u>	<u>Average</u>	<u>High</u>
CLASS I ³	1,606	1,875	2,400
CLASS II	746	1,218	1,763
CLASS III	351	578	766

1. Removed from passenger airline service (includes aircraft converted to all cargo operations or non-airline use or scrapped)
2. Excludes USSR but includes Peoples Republic of China and Taiwan
3. Classes as defined in Table 3.

TABLE 7. AVERAGE ANNUAL RETIREMENTS OF PASSENGER AIRCRAFT^{1,2}

1989	172	1997	250
1990	198	1998	257
1991	225	1999	256
1992	250	2000	264
1993	258	2001	260
1994	263	2002	266
1995	266	2003	256
1996	255		
		15-YEAR TOTAL	3,671

1. Removed from passenger airline service (includes aircraft converted to all cargo operations or non-airline use or scrapped)
2. Excludes USSR but includes Peoples Republic of China and Taiwan

Total Fleet Size

The resulting fleet size in the year 2003 as a result of the deliveries over the forecast period is tabulated below:

World Jet Passenger Fleet (end of 1988) ...	7,168
Estimated Average Additions	8,081
Estimated Average Retirements	3,671
Estimated total in Year 2003.....	11,578

This 60-percent growth in the total fleet was of concern to the group because of the lag in construction of airports and air traffic control systems. Progress in the expansion of airport and airway infrastructure will have to be made during the forecast period for the total fleet projections to materialize.

Forecast Issues

Two sets of forecast issues were identified: (1) those believed to be the most important to the development of forecasts, and (2) those that the panel felt were the most difficult to forecast.

The results of the group consensus for the first five years of the 15-year forecast are shown in Table 8. Three issues (aging aircraft concerns, airport congestion, and yield management and pricing policy) appear on both sides of the ledger, indicating that FAA forecasts might be highly volatile during this period.

Issues associated with the last 10 years of the 15-year forecast period (1994-2003) are shown in Table 9. Once again, three of the issues thought to be most

TABLE 8. FORECAST ISSUES, 1989-1993¹MOST IMPORTANT

1. Aging Aircraft Concerns
2. Yield Management and Pricing Policies
3. Airport Congestion
4. Production Capacity Constraints
5. Noise Legislation

MOST DIFFICULT TO FORECAST

1. Aging Aircraft Concerns
2. Airport Congestion
3. European Liberalization
4. Yield Management and Pricing Policies
5. Airway Congestion

1. Ranked in order of importance or difficulty to forecast.

TABLE 9. FORECAST ISSUES SECOND 10 YEARS¹MOST IMPORTANT

1. Airport Congestion
2. Noise Legislation
3. Aging Aircraft Concerns
4. Airway Congestion
5. Oil and Fuel Price Trend

MOST DIFFICULT TO FORECAST

1. Airport Congestion
2. Oil and Fuel Price Trend
3. Hub & Spoke vs. Point-to-point Traffic
4. Airway Congestion
5. Aging Aircraft Concerns

1. Ranked in order of importance or difficulty to forecast.

important were also considered to be among the most difficult to forecast. Airport congestion, noise legislation, and aging aircraft concerns moved to the top of the list of the most important issues in the second 10 years of the forecast period.

Summary

The panel felt comfortable with the 15-year totals outlined in the forecast consensus.

As a group, the panel felt somewhat uncomfortable with the apparent peaking of aircraft deliveries in the first five-year period. The high aircraft delivery rates in the first five years assumed relatively high retirement rates of existing passenger aircraft -- a

phenomenon which has been predicted for the last three years but has yet to materialize.

Continued expansion of airline hub-and-spoke networks and uncertainty about whether airlines would respond by buying smaller aircraft as they have in the past or by moving to larger aircraft to temper the constraints of airport and airway congestion were issues on which the panel was somewhat polarized and could not reach satisfactory resolution.

The panel felt very positive about the overall health of the airline and aircraft manufacturing industry.

There is a solid basis for long-term growth in the industry, as reflected in the panel's forecast of 5- to 6-percent growth in traffic and extensive replacement of existing passenger aircraft over the 15-year period.