

## AIRLINE AIRCRAFT MANUFACTURING DEVELOPMENTS

Peter Ivory, Douglas Aircraft Company

The manufacturing group developed a forecast of future civilian aircraft needs by first specifying the underlying factors stimulating these needs. Further the Panel tried to indicate the sources of the risk to that forecast. To put it in perspective, the forecast of this session will be compared with that given by the manufacturer's group at the TRB's 4th International Workshop on the Future of Aviation in 1985. (See TRB Circular No. 299, February 1986). This aircraft manufacturers' forecast to the year 2000 reflects the history of the industry. The near future is one of great promise buffeted by enormous risk.

### Sources of Aircraft Demand

The average of the group's annual average free-world revenue passenger mile forecast from 1988 to 2000 was 5.2%. This rate is just slightly less than the 5.3% forecast (for the period 1986 to 1995) made by the manufacturers group at the 4th International Workshop. The closeness of these two forecasts reflects a somewhat more optimistic outlook for air passenger growth. Nevertheless, it was the consensus that the industry would mature in the late 1990's.

The modestly optimistic outlook spilled over into the load factor forecast. By the year 2000 the world load factor was forecast to be 67 percent. This figure compares with the 65 percent forecast for 1995 made by our immediate predecessors.

Some additional factors which were considered include dispersion, fuel prices, future yields, and airline consolidation. While dispersion was expected to continue, the impact of this on the size of the future aircraft was minimal. Fuel prices were forecast to remain flat to the early 1990's, then increasing toward the year 2000. These prices will help keep airline operating costs down and hence yields will remain under pressure. Consolidation of airlines is expected to continue but at a much slower rate. Perhaps most significantly, future airline liberalization in Europe is expected to put downward pressure on European yields. The net overall effect of projected revenue and costs is for continual airline profitability.

At the beginning of this Workshop we were all informed of the September, 1987 recommendations of the Working Group on Aircraft Noise/Airport Capacity of the Industry Task Force on Airport Capacity Improvement and Delay Reduction. This group recommends that the government provide financial incentives to encourage U.S. airlines to retire Stage II aircraft from the fleet by the end of 1999. With the question of incentives open, the likelihood of binding restrictions in the 1990's is lower than when the forecasts were developed. This information directly adds an upward bias to the retirement forecast which does assume some retirement of aircraft due to noise legislation.

Unfortunately, this additional uncertainty is assigned to the retirement forecast which was already felt to be the most risky forecast component. The retirement forecasts are based upon the judgment that wide bodies will be retired in 30 years and narrow body aircraft will be retired in 25 years. This

judgment was questioned due to several factors. These assumptions were used by the 1985 manufacturer's group and about one third of the aircraft forecast to be retired by 1987 were actually retired. Secondly, airframes and engine manufacturers believe that with proper maintenance aircraft will continue to fly indefinitely. Furthermore, with stable fuel prices, used aircraft are expected to be competitively priced relative to new aircraft with much improved technology.

The retirement forecast at least partially reflects the heightened concerns about retiring aircraft based solely upon age. Now the average annual retirement of aircraft is expected to be 200 aircraft per year. At the 1985 Workshop the manufacturers group forecast 225 aircraft per year to be retired. These retirements are not expected to occur evenly over time, nor by a rigid age-of-aircraft retirement rule. Rather, older aircraft are expected to retire in great numbers during years of slow traffic growth. Overall this retirement forecast is less optimistic than the 1985 forecast, but the risk is that the current forecast is still too high.

#### New Aircraft Deliveries

The expected deliveries of aircraft needed for the period 1988 through 2000 to satisfy growth and to replace retired aircraft are presented in Table 1.

In a similar fashion to that of the 1985 Workshop, four major categories of aircraft were forecast. While the categories were largely determined based upon range, two short-range categories based upon the number of seats/aircraft are also presented.

TABLE 1    **COMMERCIAL AIRCRAFT DELIVERIES AND RETIREMENTS**

	1988-2000	
	DELIVERIES	RETIREMENTS
Short-Range 80-145 Seats	1132	1262
Short-Range 145 Seats	2030	621
Medium-Range	1322	405
Long-Range	1111	289

The juxtaposition of deliveries and retirements is instructive for several reasons. The importance of retirements has risen over the last 15 years as the jet aircraft fleet has aged. Just how important retirements are to the forecast of aircraft needs by category is made crystal clear by the values in the Table. The forecast shows a future of a larger aircraft fleet, and the fleet will consist of larger aircraft with longer range.

Again, for comparison, the 1985 Workshop forecast approximately 400 aircraft to be delivered annually, whereas this forecast is for about 430 aircraft to be delivered annually. A forecast of 430 units is well within the manufacturers' production capability. Thus, the history of fierce competition ought to be continued.

### Risk to be Confronted

After years of ever increasing orders for new aircraft, many production lines are near full-capacity, a high backlog of aircraft to be delivered exists, and now several new models have been launched. In these good times an unsettling feeling of well-being permeates the industry. Feelings of well-being are unsettlingly in this industry because they have been short-lived before.

Just as in the past, aircraft manufacturers are expected to compete fiercely for market shares. This competition resulted in reduced profit margins. To satisfy their customers not only have manufacturers geared up production, they have also accepted an increased amount of their customers' risk. In the past, airlines ordered new aircraft when times were good, only to receive them when times are bad. Some of this inauspicious-timing and risk has been transferred to the manufacturers. The most obvious case of this risk transfer are aircraft leases with quick turnback provisions. Secondly, large purchases of aircraft are typical for a small number of firm orders with the majority being future options. These conditional sales require manufacturers to block out part of their production line for these probabilistic future deliveries.

Added to the future delivery risk is the risk arising from the launch of a new product. Since most of the new products are in the development stages, consider the following problems. A new product manufacturer faces a dramatic decline in the production of his products line to be replaced. Just as revenues from the old product line are shrinking, the cost of launching a new product peaks. Furthermore, new products put price pressure on all competing products and increases the competitor's research and development expenditures. Thus, before a host of new products reach the market, all manufacturers face a burden of a reduced cash flow.

The issues considered at the 1985 Workshop were to lower cost and finance the development of new aircraft. These efforts are underway today while new risks seem even more troubling than those of the immediate past. Let there be no doubt that yesterday's risks were real. While much more progress will be made to lower production costs, today management needs to focus on the next period in the evolving history of the civilian aircraft industry. As yet undiscovered solutions will resolve the problems arising from today's risks, because the industry remains an expanding market for those who meet the challenges.

Discussion

Mr. Shinton (Avmark): Was there any discussion or consensus on the future of the retrofit programs that are currently in effect or being started?

Mr. Ivory: Yes, they would continue to be in effect. There was some astonishment that some of these programs are going forward. On the other hand, we all recognize the fact that it is very tough selling new aircraft in competition with the price of older aircraft.

Mr. Nesbit: Do you have either a beginning or ending inventory in those four categories?

Mr. Ivory: The beginning inventory is about 6,500 aircraft not broken down by category.

Mr. Nesbit: Somebody must have it.

Mr. Ivory: Yes, but not here.