

Equipment Manufacturer Issues

Airframe manufacturers, like the airlines, face future opportunities and threats. Traffic growth in the United States provides a strong boost. The increased sophistication of larger airline operators reduces "handholding" requirements and reduces product support costs. Strong non-United States markets for corporate, utility, and military versions of commuter transports will provide further sales opportunities.

But before they can realize the potential of these opportunities, manufacturers must overcome a large number of serious problems, the greatest of which is production overcapacity. Manufacturers' collective production rate estimates are two to three times their own sales forecasts. This crowded sales situation will lead to inefficient production and severe sales competition, possibly forcing some manufacturers out of the regional airliner business. Manufacturers' decreasing ability to continue customer financial assistance is another problem; however, no one manufacturer wants to be the first to lose a prospective customer.

New aircraft sales in the United States are also constrained by the availability and price of used aircraft. With 8 percent growth forecast, this constraint may not seem to be a problem. The supply of used aircraft in the United States, however, appears to grow as used aircraft models are imported. The growing availability of used aircraft continues to prevent airframe manufacturers from fully realizing the benefits of strong growth in the number of passengers carried.

The regional industry can expect continuing strong growth and an evolution toward fewer, larger, better managed airlines. Some autonomy will likely be lost as affiliations develop with larger air carriers. Financial problems are likely to continue to trouble both the airlines and their key suppliers -- the aircraft manufacturers.

AIRCRAFT MANUFACTURING INDUSTRY

David Shube, Douglas Aircraft Company

With the demand for new commercial aircraft expected to approximate 4,000 units during the next ten years, the manufacturing industry has cause to be optimistic. But intense competition among the manufacturers coupled with growing demands from the airlines to restrict capital-related costs present the industry with an unprecedented challenge. The response to these compounding pressures is resulting in major changes in the way manufacturers will be doing business -- in the criteria and approach used to make decisions and in how they are implemented. Today's environment has made it imperative that extraordinary care be taken in evaluating the cost-effectiveness of each major decision and in how the ramifications of the resulting actions fit in with overall strategic objectives.

The discussion that follows presents the seminar's forecasts of traffic growth, aircraft retirements, load factors, and the associated demand for new aircraft. In subsequent section, the evolution of the current environment will be described, followed by the seminar's view of how the manufacturing industry is and will be responding to its new world.

Traffic Growth

Revenue passenger mile (RPM) annual growth is expected to average 5.3 percent during 1986 through 1995. Minimum and maximum deviations from the average were -1.6 percent and +1.0 percent respectively. At the average growth rate, RPMs will increase by more than two-thirds by 1995.

Aircraft Retirements

During the same period 2,273 commercial aircraft are expected to be retired. Considerable differences of opinion in this estimate were displayed: the lowest number proposed was 1,682 and the highest was 3,175.

Load Factors

The consensus view was that the average annual systemwide load factor would climb to 65.7 percent by 1995. The members of the seminar were in close agreement on this projection.

New Aircraft Deliveries

The expected deliveries of new aircraft needed during the period 1986-1995 to satisfy growth and to replace retired aircraft are shown in Figure 1. Four major categories of aircraft were forecast, classified primarily on the basis of range. However, in the short-range category it was determined that two size classes would be used. In addition to the group averages, the highest and the lowest forecasts in each category are tabulated.

Table 1. Commercial aircraft deliveries 1986-1995

	<u>Low</u>	<u>Average</u>	<u>High</u>
Short-range, fewer than 145 seats	787	1,101	1,438
Short-range, more than 145 seats	830	1,165	1,547
Medium-range	714	1,160	1,522
Long-range	380	556	832
		3,982	

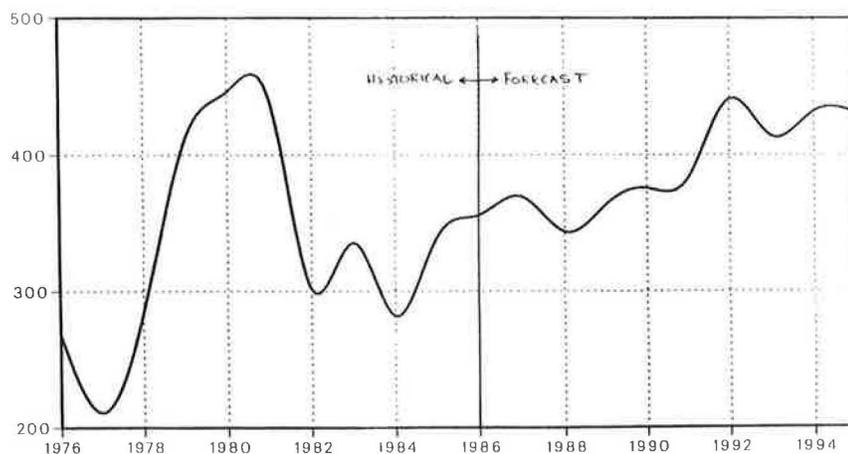
Because the "low" and "high" entries are the extremes in each category, their sums do not represent the lowest and highest forecasts of total deliveries; these were 3,222 and 4,882, respectively, or approximately -20 percent and +21 percent from the average. For comparison, 3,321 aircraft were delivered in the ten years ending in 1985. Figure 1 shows historical and forecast annual average deliveries.

It is worthwhile to note that because the production capability of the aircraft manufacturing industry significantly exceeds the forecast demand of approximately 400 units per year, intense competition is expected to continue.

Manufacturers' Dilemma

It has become painfully apparent that the aircraft industry is facing a dilemma that manufacturers in other industries have been confronted with: increasing development costs producing diminishing

Figure 1. World fanjet deliveries, 1976 - 1995.



technological returns. Concurrent with this maturation, the airlines are increasingly insistent that the aircraft they purchase must reduce or at least limit their aircraft-related costs, particularly those of ownership. This combination of technological and environmental trends is forcing dramatic changes in the way the aircraft manufacturing industry will be evaluating and implementing its decisions.

To understand how this situation evolved requires a review of the changes deregulation has wrought.

Initially, one reaction of the airlines to greater freedom was to engage in aggressive pricing battles. Considerable downward pressure was exerted on yields and profitability and with lowered barriers to entry, new low-cost airlines gave their more established colleagues even more of a challenge. As the United States airlines began to come to terms with their less-regulated world, the economic environment turned grim. Unexpected and dramatic oil price increases occurred in the late 1970s, and a deep and prolonged recession compounded the situation in the early 1980s. Airline action and reaction caused rapid shifts in pricing and operational philosophy. Yields fluctuated rapidly during this period, changing by as much as 16 percent from one year to the next. Simultaneously, the battle for market share stimulated network and scheduling changes. Hub and spoke operations became the order of the day.

Today established carriers, having gained experience in the deregulated market place, are developing strategies for survival and growth. For example, ever more sophisticated and flexible pricing strategies, such as surplus seat management, are providing airlines with greatly enhanced yield control. But the most far-reaching response of the airlines, the one that will have the most significant long-term impact, is the drive to control costs. Impressive changes have occurred. Lower labor rates, work rule changes, and more efficient use of staff and equipment have all reduced costs and improved productivity. These changes, coupled with lower fuel prices and more efficient aircraft, have significantly reduced the cash operating cost fraction of total aircraft-related costs.

As a result, airlines have become increasingly concerned about the price of aircraft, both from an investment standpoint and as a component of operating costs. The pressure from the airlines to

reduce capital costs has presented the manufacturers with a tremendous challenge. Since technological improvements incur huge development costs and attempts to recover the investment through increased aircraft prices may offset the aircraft efficiency gains and adversely affect sales, the industry has had to respond forcefully.

The manufacturers' response to these market pressures has taken several forms. First, major efforts to reduce manufacturing costs are under way throughout the industry.

Among the approaches already adopted are

- (1) 2-tier wage structures
- (2) Staff reductions
- (3) Automated manufacturing processes
- (4) Improved inventory control
- (5) Computer aided design and manufacturing techniques (CAD/CAM).

Second, and concurrent with the drive to reduce costs, is the dedication to extremely critical examinations of proposed developments. Decisions involving technological changes to the aircraft will increasingly be made only after very careful analysis of the cost-effectiveness of the proposal both for the manufacturer and for the customer. The business plan incorporating the change is required to demonstrate that stringent financial criteria such as return on investment (ROI) hurdle rates, investment limits, and cash flow constraints are satisfied. Cost estimates and revenue generation projections must be supported by considerable evidence, and prescribed risk boundaries must not be breached.

An example of how industry has been handling the evaluation of a technological innovation is the approach used to determine the viability of the ultra-high bypass engine. Enough evidence has been accumulated to indicate there is a strong probability that in the 1990s there will be available to commercial aircraft manufacturers, engine technology that will offer a dramatic improvement in propulsion efficiency gained through the use of ultra-high bypass designs. Such engines are expected to offer fuel burn efficiencies 30 to 45 percent superior to current turbofans. Despite the confidence in the engineering feasibility of this engine, the approach being taken to evaluate its

inclusion in new aircraft designs typifies the careful approach the manufacturers are taking today. In addition to rigorous technical verifications, involving in-flight demonstrations, considerable attention is being paid to the relationship of the fuel cost savings to the cost of the development.

Examination of how this development cost can be incorporated in the price of the engine and ultimately the aircraft involves evaluating sales, timing of demand, competitive responses and financial analyses from both the manufacturers' and the airlines' viewpoints.

It is clear that no matter how certain it is that the ultra-high bypass engine is technologically feasible, the ultimate criterion for its successful entry into commercial service will be whether it clears the economic hurdles for both manufacturer and airline.

Conclusion

During the short life of the aircraft manufacturing industry spectacular advances in efficiency, reliability and maintenance costs have been achieved. Attempts to pass the cost of development on to the customer all too frequently were not entirely successful, and it is evident the same pressures that caused this have been exacerbated by deregulation.

Today the pressure is on costs, and the need to carefully think through business decisions is mandatory. Very little room for error remains. The continuation of a successful industry requires, more than ever, prudent evaluation of technological improvement, determination of its acceptance and value to the airlines, and how it relates to the cost of development.

HELICOPTER INDUSTRY

David S. Lawrence, Sikorsky Aircraft

The helicopter session had an excellent cross section of the industry, including manufacturers, diverse operators, consultants, and government agencies. The discussions were issue oriented and addressed the present, the next five years, and the following five years in each of five broad areas:

- market conditions
- exogenous competition
- industry structure
- technology
- infrastructure.

The session concluded that

- Traditional markets are slowing down as growth rates in the using sectors (e.g., offshore oil) level off
- Growth will remain strong in business applications as helicopter sophistication and reliability improve
- Technology thrusts will concentrate on improving the conventional helicopter, particularly its economics and dispatch reliability.

- The critical threat to helicopter industry growth is the continued constraint of its infrastructure, principally the shortage of heliports and dedicated airways.

Market Conditions

The market for helicopters and helicopter services was segmented into six submarkets:

- offshore
- business and corporate users
- commuters
- intercity commuters
- public service and emergency medical service (EMS)
- miscellaneous less well-defined users.

Offshore Oil - Historically the largest revenue market and core of the industry's growth, this segment weakened significantly when oil exploration and development activity fell off dramatically in response to declining demand for oil and shortages of cash in the oil industry. The domestic offshore service business was projected to remain flat or to decline further from its present level of about 600 helicopters, and the session could not identify a turnaround. However, aircraft are leaving this segment at a rate of 6 percent per year through attrition or replacement; hence the entry of aircraft into the market will outpace the slow growth of seat-miles. These aircraft will come from the large reserve fleet of surplus and underutilized offshore service aircraft, because the present overcapacity will preclude significant sales of new equipment. A major new Alaskan discovery could create an activity boom, but one of short duration that would utilize excess equipment from elsewhere in the world.

The international market was seen to be a bit brighter, and it was projected that finds of affordable oil (i.e., oil of high quality and low finding costs) in the Middle East and Asia would provide a new market for helicopters. These are likely to be new equipment, since a substantial number of the surplus helicopters are leased under terms that preclude long-term operations outside of the United States. The consensus was that there would be modest growth internationally, perhaps 7 to 8 percent per year in seat-miles, barring any destabilizing political events.

Corporate Helicopters - It was estimated that business helicopter activity had tripled during the last five years, driven largely by the popularity of the intermediate twin engine types. This trend is not reflected in sales of new aircraft and is apparently masked by the influx of used equipment into this sector but fixed base operator and charter services are clearly growing rapidly. Nonetheless, sales of new business helicopters have fared better than business turboprops, of which they are a subset, increasing the helicopter share of that market from 3 percent in 1979 to about 9 percent in 1984. It was projected that the diminishing importance of used aircraft as they are assimilated into the fleet, and resolution of the uncertainty surrounding federal tax laws, would accelerate sales of new business helicopters, which might approach 12 to 15 percent of the business turboprop market in the next five years.

There was general agreement that the business helicopter market was not particularly price