

expenditures and to ensure a sufficiently large market for final products. For example, this formula has proven successful with the Tornado aircraft.

Helicopters

There are four European helicopter manufacturers (Aérospatiale, MBB, Agusta and Westland),²⁹ all capable of developing and producing models on their own. However, the European helicopter industry's effort has largely been limited to the smaller end of the spectrum of military helicopter types (with purchase of large, load-lifting military helicopters from the U.S.). The European market is not sufficiently large to support all European companies with indigenous designs, particularly because they concentrate mostly on the same end of the helicopter model spectrum. The resultant intra-European competitive pressure, combined with competition with the four U.S. producers (Boeing, Sikorsky, Bell and McDonnell Douglas), has increasingly forced European companies to undertake joint programs. Thus, there have been several co-operative programs between the major helicopter-producing European countries, for instance, the Anglo/French agreement to produce complementary types of aircraft (Puma, Lynx, Gazelle). Nevertheless, European companies have demonstrated that they can be competitive on their own. This is illustrated by Aérospatiale's investment in the U.S. and its success in obtaining a contract to provide helicopters (Ecureuil) to the U.S. Coast Guard.

Engines

Since the 1980's, the European aircraft engine industry has been marked by a period of growth similar to that recorded by the airframe production industry. European commercial jets have so far been fitted mainly with American engines. Thus, the growth of the industry is due mainly to the fact that American aircraft are being fitted with engines produced wholly or partly in Europe (Rolls Royce RD211 and CFM56 manufactured by General Electric U.S. and SNECMA in Europe).

European Aerospace Co-operative Programs

An overview of the European aerospace industry indicates clearly that co-operative programs have

played an important role in the industry's development. An understanding of European aerospace co-operative programs is thus important for Canadian companies attempting to understand how the European industry functions.

Recently developed close collaboration between European builders has resulted in technological success stories such as the first supersonic commercial jet, the Concorde; civil commercial aircraft such as the Fokker and ATR; military aircraft such as the Jaguar, Tornado, Alpha Jet, Transall and Atlantic; the previously mentioned Airbus; and the Puma and Gazelle helicopters.³⁰

By supporting co-operative programs that call for builders from many countries to work together, the European aerospace industry has asserted itself during the past few years. In terms of market success alone, the result has been that, thanks largely to Airbus, the EC has gone from a net importer of commercial aircraft in the early 1980s to net exporter over the last few years. Airbus is now the second largest world supplier of civil commercial aircraft, with approximately 25 per cent of the market, and expects annual production to reach 200 aircraft by 1993 (up from 61 aircraft in 1988).³¹

In summary, European companies have been working together, and co-operation is growing, due to ever-increasing R & D costs, arising from the fine tuning of complete systems and other high technology products. This phenomenon is intensified by co-operation and mergers on national and international levels. Examples of this are MBB-Dornier-Daimler-MTU and GEC PLC-Plessey-Siemens, the Airbus and Tornado consortia, the U.S. collaboration on the F-16 program (production), and the international joint ventures of Snecma-General Electric (U.S.) and Lockheed-Aérospatiale. However, difficulties have been encountered in these collaborative efforts. Table 6 (in Appendix A) shows examples of European collaboration programs in progress.

Technological Developments

As mentioned previously, one of the main driving forces behind the growth of international co-operation in the aerospace industry is the need to invest large sums of money in R & D. The