

EIGHTH EUROPEAN ROTORCRAFT AND POWERED LIFT AIRCRAFT FORUM

TRENDS FOR FUTURE ROTARY WING AIRCRAFT

by

B. PASQUET & Ph. PICOLLET
Société Nationale Industrielle Aérospatiale

Helicopter Division
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INTRODUCTION *crit.*

A questionnaire was sent to a selection of helicopter operators. It covers missions as different as agricultural spraying, executive transportation, logging, fish spotting, offshore transportation to name but a few. Forty three answers have been received and we want to take the opportunity to thank those who devoted their time to helping us with this survey.

The return rate is sufficient enough to prove that operators are interested in having their say about the helicopter's future.

We will now deal with the topics which have generated the most numerous comments and those which have brought some interesting results. A simple statistical analysis of the answers to the questionnaire is given at the end of the paper.

MAIN LIMITATIONS

Limitations and shortcomings most frequently quoted include in decreasing order :

- High cost, be it acquisition cost, operating cost or maintenance cost.
- Low range, particularly with optional equipment fitted.
- Unsatisfactory high-altitude and hot-weather performance.
- Low one-engine inoperative performance.
- High internal and external noise levels.
- Unsatisfactory general level of performance.
- Inadequacy of affordable equipment for operations in bad weather conditions.
- Limited comfort, particularly as regards vibration levels and space allowable for luggage, rafts, etc.

Other topics, not directly related to mechanical capabilities, have emerged. The single most important one is the limitation brought to helicopter operations by regulations not well suited for helicopters. As for regulations tailored for helicopters, Category A take-off and landing procedures are seen as the most restrictive.

GENERAL DESIGN AND PERFORMANCE

From a general point of view, an improvement in maintainability and reliability has been noticed on the latest models.

However, improvements are still required because maintenance is considered the main operating cost contributing factor. Engines and their ancillaries are the most criticized items of equipment, particularly as far as unscheduled maintenance and M.T.B.F. are concerned.

Everybody would like an increase in payload capability, while retaining the size of the aircraft.

The main point is that the full payload should be available in an equipped helicopter with full tanks.

This would solve most of the complaints voiced against poor payload/range characteristics.

Of course, some operators have some specific requirements :

Offshore operators would like to be able to fly 1,000 N.M. with large twin-engine aircraft and fly 800 N.M. with aircraft of the 9/14-seat category.

Otherwise 300/400 N.M. seems to be the average maximum distance to be flown in a helicopter. These distances are covered by the present generation of aircraft.

As for payload, the most demanding requirements are those related to cargo sling or logging missions.

The lifting capability envisioned to fulfill most of the future requirements is on the order of 1,800/2,400 Kg. This corresponds to an aircraft in the 4/5-ton class which should then be twin-engined if opinions expressed in the questionnaire are to be taken into account.

As far as design and ease of operation of the helicopter are concerned, other criteria have a role to play: passenger and pilot comfort and good acceptance by communities are topics to be addressed.

Many problems prevent helicopter comfort levels from matching those of airliners.

From a passenger point of view, these problems are related to noise, vibrations, available room and the quality of their seats.

As for pilots, we must add the workload associated with flying, managing radio-communications and navigating close to the ground and the related flying hazards.

Present solutions to the first problems quoted usually bring payload and cost penalties:

- soundproofing and use of high

contact-ratio gears for transmissions help with internal noise problems.

- vibration level reductions are associated with sophisticated absorbers and suspensions. These devices may even involve the seats and the cabin floor.

- cabin space, which is always felt to be in short supply can be found in a larger aircraft to the detriment of economics.

Pilots' problems, though quite real are not considered a major operating limitation. Nevertheless, alarm and warning systems are still the subject of complaints.

Low level flying operation efficiency would be easily improved with better outside visibility. Operators agree that one solution to reach this goal would be to reduce the instruments panel size but not at the price of degraded instrument legibility.

It appears from the answers to the questionnaire that the future solution may lie in the adoption of Cathode Ray Tubes; moreover they would bring improved reliability and a versatility not possible with electro-mechanical instruments.

The acceptability of those instruments is closely related to their selling price. It should be about that of current instrumentation, the extra functions and display capability coming as a bonus.

Reduced pilot workload and weariness through a mini-stick associated with advanced controls is not a concept familiar with operators. This interpretation could explain why operators are reluctant to accept this device.

SAFETY

The main topic addressed concerning safety of operation dealt with the choice between a single or a twin engined helicopter. For a medium class aircraft, preference was given to a single-engined aircraft. The decision was often based on economic considerations but added safety was also an objective.

Indeed twins with a low level of OEI performance are not considered safer over firm ground than single-engine aircraft with good autorotation capability.

This does not take into account customers and regulation requirements.

AVIONICS AND EQUIPMENT

People are generally satisfied with their avionics, the most appreciated item being the autopilot.

IFR instrumentation is more often associated with medium and large helicopters.

If a performing navigation system was deemed necessary, long distance radio aids such as VLF or LORAN C would be favored.

A last point worthy of mention is that some sort of equipment standardization would be appreciated.

TRAINING

Some operators have small fully instrumented helicopters in their fleet whose purpose is to train their pilots and keep them up-to-date with IFR and emergency procedures.

Nevertheless, it is recognized it is not the most convenient solution as the vast majority of operators have expressed a need for the use of training simulators. Mainly for cost reasons, they would resort to the services offered by specialized companies.

CONCLUSION

The number of remarks and the variety of topics addressed in the answers to the questionnaire sent to operators prove that they are interested in the development of rotary wing aircraft.

A good many of the comments were dealing with economics. The objective of everyone concerned should be to reduce helicopters operating costs to a level comparable to those of fixed-wing aircraft. In the process helicopters should not lose part of their versatility.

As far as future requirements are concerned, advanced formulae, with a capability of 12 seats or more could provide lower operating costs at speeds 50% over those possible with current helicopters. A condition for their acceptance is that their purchasing price should not exceed that of a similar-payload helicopter by more than 20%.

The aircraft and their equipment are not the only points capable of improvements. Regulations are seen as a limiting factor in the improvement of the services rendered by helicopters.