



DIFFERENT WAYS TO BE USEFUL

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1. PREMISE

The purpose of my lecture is to present you some considerations about a particular aspect of the military employment of the helicopter that, in a certain way, could be considered the departure point of the tremendous growth of the importance of the helicopter itself as essential mean for improving the operational effectiveness of the Land Forces, within the airmobility doctrine.

I'm referring to the so called "utility role" of the helicopter in support to the ground operations.

After that, I'll try to evidence some guide lines on how this role could be performed today.

First of all: What exactly "utility" means? Looking for the definition in the Oxford Dictionary, I found that this word simply means "quality to be useful"; but, if applied to a vehicle, it indicates that the vehicle "can be used for various purposes".

Consequently, if a helicopter was not conceived and developed for performing a single particular role, or, if you like, for a particular purpose, it can be classified as "utility helicopter" if it can perform quite different roles.

Let's consider the combat and the transport roles.

A dedicated combat helicopter is not an utility helicopter even if it is employed in attack, anti-tank, reconnaissance or air-to-air engagements. In fact, these are different missions within the basic combat role. If not specialized for only one of these

missions, I would define such a helicopter a "multi-mission combat helicopter".

As an example, the AH - 64 APACHE is an "attack helicopter", while the A 129 Mangusta and the future LHX can be defined "multi mission combat helicopters".

On the contrary, an aircraft basically designed for transporting men or materials, in small or large quantities, can be classified as "utility helicopter" if, with opportune adaptations and the installation of adequate equipment, can perform quite different roles than the transport. In such a case, the aircraft could be also classified as "multirole helicopter".

Let me shortly expose some considerations about the classification of the military helicopters within the NATO. This is another aspect of the difficulty to implementing the Rationalization, Standardization and the Interoperability concept among the Members of the Alliance, even if limited to the classification of materials employed for the same purposes.

As member for many years of NATO and FINABEL Working Groups, I tried to give my contribution to the standardization of the helicopter classification, but without appreciable results.

Practically each Nation adopted own denominations, not only because of the national language (that could be accepted if, in parallel, there were standardized NATO denominations), but also for different definitions of similar operational roles.

So we have to day light helicopters, observation helicopters, anti-tank helicopters, support and protection helicopters, utility helicopters, multirole helicopters, maneuver helicopters, tactical transport helicopters, medium transport helicopters.

I'm not sure that all the possible variations are included in the list. However another category is approaching: the "light battlefield helicopter", on which I'll revert later.

2. THE UTILITY CONCEPT

On the beginning of my speech, I said that the "utility role" of the helicopter was the starting point of their operational use in the modern warfare.

The transport capability of relatively large helicopters for tactical and logistic purposes was self demonstrating since the Korean war. But the small Bell 47 G with its spectacular versatility was the first example of the utility concept when employed as a flying Jeep for liaison and observation and air ambulance. Certainly the helicopter pilots of the Korean war realized the potential of the machine for performing also as aerial fire platform.

In fact that was practiced in subsequent operations in French Indochina and in North Africa. But the Viet Nam war offered the scenario for the airmobility doctrine and, within this doctrine, for the demonstration of the validity of the utility concept if properly applied.

What means "properly applied"?

Practically, all transport helicopters could become "utility helicopters". But if we take in mind the Land Forces operational environment, it is evident that, besides the transport capability, the alternate main role we would require for a utility helicopter is the combat capability.

These are contrasting exigencies because the more a helicopter can transport, the less it is able to face the close combat situations. A compromise is then necessary. Utility or multirole: yes, provided that in each role the performance be acceptable and significant in its effectiveness.

In the Viet Nam war the demonstration of these criteria was given by the archetype of the modern utility helicopters, the BELL UH-1 that, becoming the "utility helicopter" by antonomasia, was the backbone of the airmobility not only of the US Army but of many Armies all over the world, where it is still flying after almost thirty years of uninterrupted service.

3. THE HUEY

If the UH-1 can be considered the archetype of the utility helicopters, let's examine its main features in order to understand the reasons for its particular suitability for the utility role and for identifying, if possible, the guide lines for configurate the characteristics of a modern aircraft able to replace its glorious ancestor.

First of all, let's consider volume and general dimensions. The UH-1 (in its more employed model, the UH-1D/H) is a "squad helicopter", able to transport a basic infantry combat group up to 11 - 13 men, with enough available space for the equipment. Alternate transport capabilities, are six litters or 1.2 ton of internal cargo or 1.8 ton of externally suspended cargo.

With these basic capabilities, the helicopter is compact and consequently able to operate in the forward area of the battle-field not only for performing its basic transport role but also the alternate combat role, at least in an operational environment comparable with that of Viet Nam war.

In fact the HUEY became a "weapon ship", equipped with various armament systems, such as machine guns, rockets, granade launchers, also performing as test platform for the TOW anti-tank system.

The contribution of the UH-1 to the ground operations was excellent also in the armed configuration until the improved anti-aircraft capability of the Viet Cong and the North Vietnamese forces dictated to derive from the same HUEY a dedicated combat helicopter, the AH-1 COBRA.

Notwithstanding the positive results of the actual operational employment and the general acknowledgement of the compliance with the utility role, the UH-1, being a son of the technologies of the "fifties", demonstrated a serious lack of military characteristics against the operational requirements dictated by the modern high density battle-field.

The critical points were:

- agility, maneuverability;
- power to weight ratio;
- speed, hovering and rate of climb;
- reliability and maintainability;
- general management of the aircraft system;
- general layout of the cabin;
- flight safety;
- unacceptable reduction of performance in hot and high flight conditions;
- and, mainly, survivability in all the aspects.

4. CONCEPT ESCALATION: THE TACTICAL TRANSPORT

Preparing the replacement for this helicopter in view of expanding the implementation of the airmobility doctrine, the US Army moved from the negative points of the UH-1 experience for defining the operational requirements of a new utility helicopter, in which the transport capability in tactical conditions were particularly stressed. The new concept was condensed in the UTTAS program, where UTTAS means UTILITY TACTICAL TRANSPORT AIRCRAFT SYSTEM. As you see, the utility concept was retained together with the new concept of "tactical transport".

But, as it often happens in defining the operational requirements of new military systems, also in this case the program became more the escalation than the evolution of a well proved concept.

The result was the development of the UH-60 BLACK HAWK and you can see in this table (Annex A) the differences between the UH-1D and the UH-60 noting that, against the same basic requirement to transport a fully equipped infantry squad, the BLACK HAWK has an empty weight higher than the maximum take-off weight of the HUEY.

Of course other stringent and important requirements were met, mainly in terms of performance, reliability and survivability.

However it is hard to say that the BLACK HAWK can perform the same utility role in the same acception of the UH-1, unless its potential/multirole capability is seen in other military applications outside of the ARMY operational environment such as in the naval ASW role.

Let me remind that the utility concept on which I'm discussing, is related to the Ground Force operational environment and not to the interservice multirole capability of an aircraft.

The UH.60 was also equipped with special equipments and sensors for EW and special operations. But for the ARMY, particular and sophisticated configurations cannot considered in the normal spectrum of employment of an utility helicopter.

Although the BLACK HAWK is presented also in armed configurations, the possibility to provide a direct and close fire support to the ground operations is only theoretical and very unlikely because a helicopter of this size could be at least seen as an aerial artillery platform suitable for long range indirect fire interventions.

I wish to underline that the BLACK HAWK is a wonderful military helicopter conceived and developed according to precise US ARMY requirements. But it basically is a dedicated tactical transport helicopter not characterized by the operational versatility requested for a true utility helicopter. Of course, the same considerations can be applied to the NH 90, under development, even if the program is based on a interservice capability of the future aircraft that shall meet the requirements of the Ground Forces for a Tactical Transport Helicopter and of the Navies for a "Frigate Helicopter".

5. CONCEPT EVOLUTION: THE BATTLE-FIELD SUPPORT

As you certainly know, the Land Forces airmobility is an essential aspect of their operational effectiveness.

In fact it represents the possibility of extending the freedom of action into the third dimension, performing tactical and logistic duties with higher speed, flexibility and adherence than conventional surface vehicles could provide.

Fundamentally the airmobility allows to move and combat by air. But, expanding these two simple requirements in a list of the possible roles and missions, we realize the tremendous potential inherent in the airmobility doctrine:

- command and control;
- liaison;
- surveillance;
- fire control;
- electronic warfare;
- medical evacuation;
- reconnaissance;
- fire support in various forms, mainly anti-tank;
- tactical and logistic transport of different basic payloads corresponding to particular operational requirements.

Notwithstanding the peculiar operational versatility of the helicopter, it's evident that different aircraft are necessary for meeting different exigencies requiring particular characteristics and performance, although the proliferation of the flight lines should be avoided.

In a high density battle-field as envisaged by NATO studies, the combat exigencies can be fully satisfied only by dedicated helicopters in which combat capabilities and survival probabilities are obtained through an harmonized integration process.

As far as the transport requirements are concerned, the performance must have positive and

significant impact on the operational effectiveness. Consequently the basic payloads of the helicopters should range from a squad size cargo, as a minimum, up to platoon size cargo, considering the men fully equipped, with wide volume available for other operational equipment.

The corresponding material capacity shall be of the same level, but with higher values for externally transported cargoes.

These requirements evidently configure aircraft of the size of the already mentioned Tactical Transport Helicopters and of the Medium Transport helicopters as the CH-47 and the EH 101. These machines, both for economical and operational reasons are not suitable for the numerous duties specifically requiring smaller aircraft or for which the employment of a large helicopter would represent an unuseful wastage of economical resources.

The present trend in NATO environment is to regroup the basic airmobility requirements in a category classified as "battle-field support" that includes the following roles/missions:

- reconnaissance;
- fire control;
- surveillance;
- medical evacuation;
- light transport of men and materials, particularly Command/Control/Communication teams of about 5/6 men;
- fire support (optional).

The preliminary examination on how the already defined requirements can be met has been given to the NIAG (NATO Industrial Advisory Group). I cannot now neither expose the requirements in details nor anticipate the results of the NIAG activity. However, in general, the future aircraft should be a 3-4 ton class helicopter, dual or single engine configuration, with particular military features and technological innovations for being adequate to the operational scenario of the next century.

Considering that the NATO studies in this field are aimed to establishing cooperation programs for the development of an aircraft that, meeting the above indicated requirements, should replace the light helicopters of about 1.2-2 tons, still in service, it seems to me evident that this new "battle-field support concept" applied to the airmobility sector, is nothing else than an updating of the original "utility concept" transferred on more militarized plan.

Personally I think that if the envisaged weight class, if confirmed, would not allow to fully meeting the requirements with the risk to develop and acquire an aircraft characterized by a poor cost/effectiveness ratio.

However, let's wait and see. In the mean time I would try to configurate possible future Army Aviation Flight lines following an evolution based also on the implementation of the "battle-field support concept".

6. EVOLUTION OF THE ARMY AVIATION FLIGHT LINES

If all the roles shall have the corrispondent aircraft, it is envisageble the employment of the following helicopters:

- a Light Battle-field Helicopter;
- a reconnaissance/protection/air-to-air helicopter, to be employed indipendently or in support of attack/anti-tank helicopters;
- an "heavy" attack helicopter;
- a Tactical transport helicopter of about 8-9 tons;
- a Medium transport helicopter of 15-20 tons.

This is a very "rich" solution that would probably adopted only by the US ARMY, although, on the present time, their modernization program does not include a Light Utility or a Battle-field support helicopter. On the European side of the Alliance it is very unlikely that this solution could be adopted. Nevertheless the Battlefield helicopter would remain while the combat role could be sustained only by one helicopter and in some cases the transport requirements would be limited to a Tactical Transport Helicopter.

Consequently the flight lines could have the following alternate configurations:

- a Battle-field helicopter;
- a "multimission" combat helicopter;
- a Tactical Transport Helicopter;
- a Medium Transport Helicopter;

or:

- a Battle-field helicopter,
- a "Multimission" Combat Helicopter;
- a Tactical Transport Helicopter.

Of course the decision to adopt one or the other solution depends on many factors that are under the responsibility of the national Staffs and, obviously, I'm not in position to express any suggestion.

I would only recommend to give more attention to the Medium transport that could better comply with the mobility requirements of reserve units and supplies on the European scenario, taking into account the improvement of the conventional capability that cannot be acquired by numerically increasing the forces but improving their effectiveness and operational flexibility by a higher mobility level.

Finally I would just mention another utilization of the Future Battle-field helicopter by possible users that would replace the present utility helicopter line with a modern similar class helicopter.

This perspective should dictate the characteristics of the aircraft to be configurate without compromises as second generation Utility helicopter in order to meet transport and combat requirements without the limitations of the ancestor.

If the proliferation of the helicopter production must be avoided, it is clear that a future Battle-field helicopter should be able to cover both the new battle-field support and the classical utility requirements.

7. THE MILITARY/INDUSTRIAL ITALIAN SOLUTION

Some years ago, when I was still in service as responsible for the RD activities in the Army Aviation sector of the Italian Army and for the development of the A 129 anti-tank helicopter, the Army General Staff allowed me to present in this Forum the orientations of the Army as far as the evolution and the development of the Army Aviation were concerned.

Among other aspects, I exposed an innovative approach for realizing an effective combat capability and renewing part of the flight line. The guide line was the "helicopter family concept" where the exigencies of acquiring a light anti-tank helicopter, a reconnaissance/scout helicopter and a light utility helicopter were to be met by a single aircraft matrix subsequently developed in three versions.

Later, a similar concept was defined by the US Army - independently, I suppose - for the LHX program and the European FINABEL organization produced a document containing the "Basic data for the study of the characteristics of the future light combat helicopter".

In this document there are described three versions of a same basic machine: anti-tank, support/air protection, combat support.

The ongoing NATO initiative for the "Future light battle-field helicopter" took also into account the FINABEL indications.

In the mean time the Italian A 129 family has its first son: the A 129 MANGUSTA anti-tank version - that will enter service this year - while all data are available for the actual development of the reconnaissance and "light-utility" or, if you like better, the "battle-field support" versions.

Certainly you have realized that both the Italian Army requirements and the international programs and studies contain the adjective "light". An adjective indicates a quality, not a quantity, consequently different implementations of the concept are possible.

There is the danger to do something too little or too big, going out from the limits of well applied cost/effectiveness criteria.

However for the Italian Army the "light concept" was related to a weight class of about 4 tons for obtaining aircraft:

- dimensionally suitable for the various envisaged roles;
- less demanding in terms of acquisition and general management costs.

But all that without renouncing to any of the essential features necessary for operate and survive in the modern battle-field such as:

- high combat capability and survivability, by day, by night, in adverse weather conditions, in a high density operational environment of NATO type;
- high mission flexibility with different armament;
- easy operational control and management thanks to an advanced computerized integrated management system;
- low life-cycle cost;
- easy maintainability in field conditions;
- adequate growth potential and easy updating with new operational equipment;
- adequate and hoc developed Integrated Logistic Support.

All these requirements were fully met by the AGUSTA design thanks to innovative design concepts and the adoption of innovative technologies.

All these aspects are basic characteristics of all the present and future members of the A 129 family.

Consequently, the Battle-field support version of the A 129 will not be a commercial helicopter more or less militarized, but a true military helicopter retaining all the features of the combat version, able to sustain the "utility role" in the modern acception of the word as real and effective "battle-field support".

The comparison of the main characteristics and performance of the UH-1D/H and the A 129 BSH demonstrates the generation jump between the two aircraft (Annexes B and C).

Coming back for a while to the possible configurations of the future Army Aviation flight lines, we can see, as regards the Italian Army, that the A 129 family will allow the substantial implementation of the Rationalization, Standardization, Interoperability concept in a fundamental sector of the Land Forces airmobility.

This possibility is indeed a reality with the present A 129 and is a sure perspective in the future evolution of the A 129 as envisaged in the LAH program

8. CONCLUSION

Very simply, my conclusion is that, if the helicopter offers many ways to be useful, from the military point of view its more attractive aspect remains the operational versatility inherent in the "utility concept" presently evolved into the "battle-field support" concept.

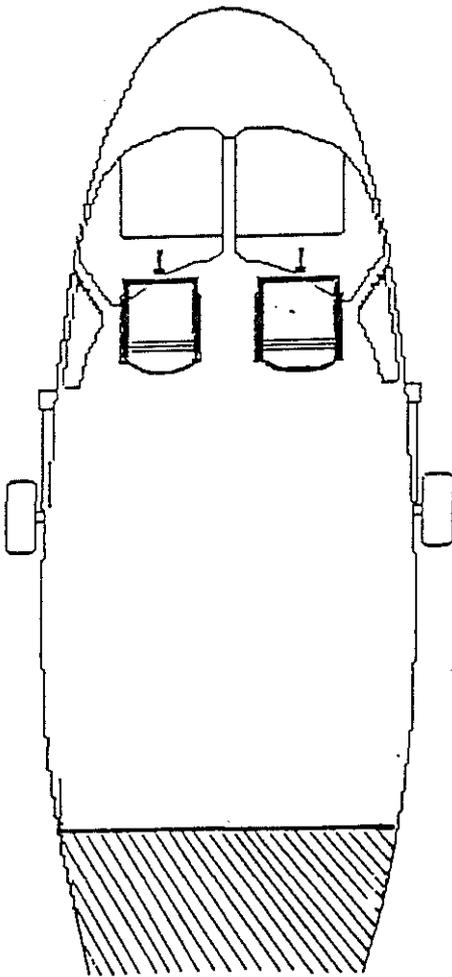
ANNEX A

ESSENTIAL CHARACTERISTICS AND PERFORMANCE		UH-1D (H)	UH-60A
Max length (rotors turning)	m	17.6	19.76
Max height (TR turning)	m ₃	4.41	5.13
Cabin volume	m ³	6.23	11.61
Empty weight	Kg	2363	4819
Max T.O. weight (alternate)	Kg	4309	7375 (9979)
Useful load	Kg	1946	2556 (5160)
Fuel	Kg	656	1064
Power Plant	SHP	1X1400	2X1560
Power to weight ratio	SHP/Kg	0.325	0.423 (0.3139)
Passengers capability	No	11-13	11-14
Max external cargo	Kg	1814	3630
Litters	No	6	6
Cruise speed	KTS	110	145
Max R.O.C. (SL)	Fpm	1600	2000
H.I.G.E. (ISA+20°C)	m	2286	2895
H.O.G.E. (ISA; ISA+20°C)	m	1220;300	3170;1705
Range (at max T.O. weight)	Km	500	600+30' res
Survivability features			
- Ballistic tolerance		NO	YES
- Crashworthiness		very limited (fuel sys only)	YES

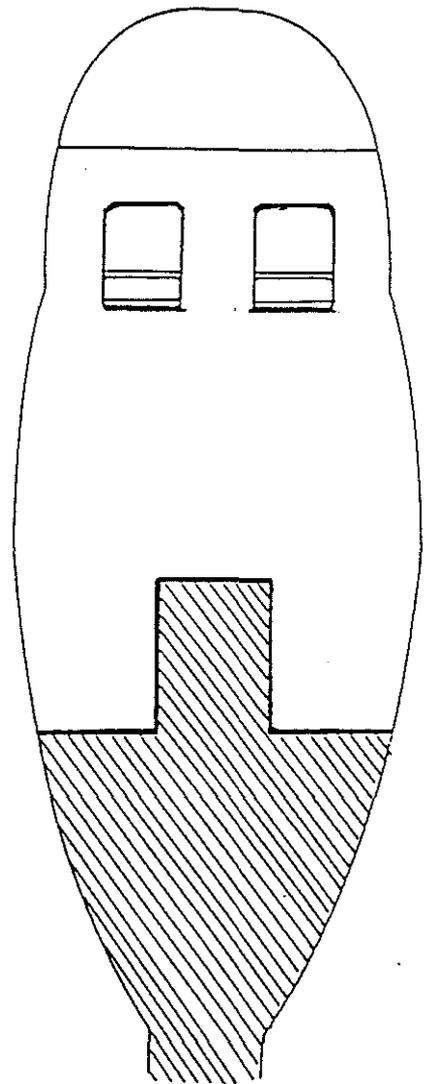
ANNEX C

A 129 / UH - 1D

CABIN AREA COMPARISON



129 UTILITY



UH - 1D