Flying in high-altitude areas: An operator's viewpoint

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The entire process of induction, operation and deinduction from high-altitude areas is presented. The author discusses the various problems which occur in aircraft operating from and over these regions. Problems perceived such as disorientation, high-altitude ejection, bail out, cold, etc., are presented and operational solutions are discussed.

Keywords: Flight operations, High altitude.

The Indian subcontinent has geographical boundaries of the Bay of Bengal and the Arabian Sea in the south and the mighty Himalayas in the north. The onus of maintaining a constant vigil on the vast borders lies on the Indian armed and paramilitary forces. In the purview of their duty the troops have to at times stay at places which are located up to 6096 m AMSL. Since the terrain of the Himalayas is inhospitable, the only means of supporting the ground forces is by air. The Indian Air Force as well as the Army utilize their aircraft and helicopters for this purpose. The high altitude operations in our terminology start from airfields and helipads located above 3048 m. The high-altitude operations in India started right after the Indian independence in 1947, when a DC-3 aircraft of the Indian Air Force landed at an unprepared strip at Leh in Jammu and Kashmir. Since then these operations have come a long way and these days helicopters and aircrafts fly and operate at these altitudes day in and day out. India has also got the distinction of having a few of the highest airfields of the world and these days we have regular scheduled flights also operating to these places. However, the operations from these altitudes impose a lot of restrictions on the machine as well as on man due to a number of reasons. We will discuss the effects of altitude on the machine and the operator.

Effect on the machine. The atmosphere gets rarer as the altitude increases. This also reduces the aircraft performance as the engine performance, airframe performance and the rotor performance reduce. The response of the controls also becomes sluggish. This results in the aircraft carrying lesser load when taking off from these fields and also operating at all its limits. The temperature rise during summers further worsens the situation. To quote a few examples, an aircraft which carries almost 40,000 kg of payload at sea level cannot take off at all at an altitude of 3048 m, even without any load, if the temperature exceeds 25°C. Similarly, an aircraft which carries 4500 kg at sea level can carry only 1000 kg at 3048 m and only 400 kg at 4572 m. This affects adversely the morale of the troops as they are the ones who have to be left behind because the essential outgoing load from these bases is the passengers only. At times, a lot of requests are made to the pilots to carry patients or persons proceeding on leave for extreme compassionate reasons. In case a pilot succumbs to these pressures, he further reduces his safety margins, bringing him under further stress. Further, the valleys in which these aircraft operate are often too narrow for the aircraft to manœuvre safely. Thus, once an aircraft descends into the valley, it is committed to land and after that it just cannot abandon the landing. This demands a higher concentration level and ultimately increases the fatigue factor of these sorties as there is just no scope for error.

Effect on the operator. The problems are further compounded as the pilots operating at these places rarely get time to acclimatize as they keep shuttling between the and high altitudes. However, after having realized this problem at present the pilots are not permitted to fly for at least one day and two nights after reaching these places. The physiological problems that one faces at high altitudes are more

than amply clear and do not need to be elaborated, except mentioning that one is prone to hypoxia. In case of pilots who are inducted from the planes, mild headache and a heaviness in the head is a common phenomenon for the first two days. Often, people use oxygen even while sleeping to ward off these maladies. Mild hypoxia is also a common occurrence and can affect anyone if the person is not careful about his oxygen management. This reminds me of an incident which occurred with me during flying on one of the missions. I had taken off for a supply-dropping mission to a dropping zone located at 4572 m. The sortie involved climbing to about 5791 m and thereafter descending to the drop zone. There was mild clouding and the temperature was about 0°C. My third crew member had spent about 10 days at high altitude and was not in the habit of donning his oxygen mask and used to take a puff or two of oxygen every 1 or 2 min. We were climbing passing through 4572 m, when suspecting icing I asked him to switch on anti-icing. He responded to my command but instead of putting on anti-icing he changed the communication frequency on the radio set. This could have been serious, and after that, to this day I have not seen any of the crew members without their oxygen masks. In winters the crew are exposed to extreme cold conditions, especially in the unpressurized cockpits of helicopters. To give you an idea of the clothing required for operations, a pilot in a helicopter wears at least two to three pairs of woollen socks, two pairs of gloves, a polo neck pullover with a scarf, specially designed woollen inner, trousers and jacket, a woollen cap, oxygen mask, headphones and sunglasses. As the clothing becomes cumbersome, the feel of the controls is also lost. Even after all this protective clothing the hands and feet become cold and at times even numb. The worst-affected persons amongst the crew are the load master and the supply drop crew, as they are in the open rear of the helicopter. They are affected by the cold blast also and I have seen the dropping crew and the load master carrying arctic sleeping bags to the helicopter to ward off the cold on the return flight after the drop. However, the irony of the situation is that even after all these precautions, they still land up with red noses and swollen faces. The cold affects the ground crew also as the maintenance and servicing of the aircrafts becomes difficult. They too have to operate with thick gloves because if they touch any part of the aircraft with bare hands they land up with cold burns. Maintenance requirements also increase as every item of the aircraft has to be checked thoroughly and certain additional servicing has to be done on a regular basis, which is normally not required in the planes. For example, they have to clean the aircraft heaters every day and in the winters the batteries have to be removed at the end of the day's flying and put back before the commencement of the next day's flying in order to prevent them from getting discharged. However, the worst part about the maintenance is that the ground crew can lay their hands on the aircraft only just after sunrise when the temperatures are the lowest and there is no sun to give whatever little warmth it can give, or work just before sunset, when again the sun has gone down behind the hills and also the winds are about 50-60 kmph, further increasing the chill factor. Further, the crew cannot work very hard either as there have been cases of high-altitude pulmonary oedema. The strong surface winds also cause a problem for the pilots as the turbulence increases, as a result of which the pilot has to fight with the controls continuously, increasing the fatigue factor of these sorties.

The stay at these places poses problems in terms of lack of entertainment, exercise, normal social life and difficult living conditions. In case of bad weather, which is often the case during winters, during which no flying can be undertaken, aircrew are totally at a loss for things to do. This affects the morale adversely and increases the feeling of loneliness amongst the operators.

The working hours can be rather long and there are no weekends to relax as every good weather day is a working day with new chal-

lenges. The operations are also peculiar, as one can neither fly totally on instruments nor even visually. The flying is visual but instruments have to be relied upon to maintain correct attitude, direction, height, etc., as the horizon is not clearly discernible and the valley floor can give a false impression of the flying level when actually one may have a bank of 5–10°. In case of bad weather, diffused light prevails and there are no shadows because a continuous white cloud layer appears to merge with the white snow surface, erasing all reference points, including the horizon, ridges and natural features. This condition is known as 'white out' or the 'ping pong ball effect' and can easily lead to disorientation. I know of an accident in which two pilots lost their lives while abandoning an important casualty evacuation mission. The problem of disorientation is also encountered during clear weather because when the skies are absolutely clear, there are places where the terrain is such that there are no shadows, and due to this monotony depth perception is lost. There have been a number of cases where during absolutely clear weather pilots have touched down well short of the helipad while attempting a landing. Ultimately, the problem was overcome by having route markers placed on the approach path, but even this was not a 100% solution, as the route markers also get submerged with just one snowfall, and in the terrain of operation that I am referring to, at times the snowfall continues for 10–12 days at a stretch. A lot of troops have lost their lives while walking from one tent to the other during snowfall and blizzards as all the landmarks had got obliterated due to the snowfall. Clear weather also imposes problems as the reflection from the snow and the glare also increase. This, at times, has led to eye problems in the case of operators.

The nature of operations in Indian armed forces is such that a person operates in the same theatre of operations for a long period. Due to this, the operations become monotonous and thus at times a person can become overconfident and callous in operations. This reminds me of another incident while I was flying with a load master who had spent about 4 years operating in the air dropping role. In order to check his reactions I did not follow the proper procedure of giving a countdown for the load to be dropped but told him to eject the load when I reached the dropping zone. He was totally spellbound and did not eject the load. Thereafter, we did a normal drop and when I asked him as to what was the reason for his not taking any action, he stated that to this day he had not encountered a situation like that and therefore he thought that such a situation would not arise. The monotony of the operations also gets amplified if a person has to fly almost 8–10 missions on the same day in the same valley and continue operating there for weeks on end.

Nobody can deny that the hills are beautiful and one cannot help but get overawed by their beauty and serenity. This, at times, can lead to a false sense of security. This is especially valid in the Siachen Glacier, where one could be affected by enemy fire. I can recall an incident where while on approach to helipad I suddenly saw a flash in front and realized what was on and turned back immediately. Further, the psychological impact of having to force-land in a totally inhospitable terrain can also not be ruled out. The problem of survival would be even greater in the case of fighter crew, as in the case of ejection the rate of descent would be higher and the drift due to the strong winds could take them away from the valleys, which could further compound the problems of search and rescue.

In the end, all I would like to say is that what I have said is unique to our country and is faced by every pilot. Still, the challenge of operating at these altitudes at your limits, at the limits of the machine, is a great adventure and asks for ultimate professionalism. This has to be displayed by each and every person operating in that region to support the troops and do what the armed forces are meant for – survive to fight yet another day and keep the sovereignty of the country intact.