Visionary VisionAir

In 4ROTORS No.4 we described Moving Terrain's MT VisionAir X Heli and the detailed representation its high-resolution display (6.5 in, 1024 by 768 px) offers in the Relief Dynamics 3D View mode.

Moving Terrain offers its system in a modular concept: Every user decides which additional options to order in accordance with his operational requirements.

The flight characteristics of the helicopter have as a "natural" consequence that missions are flown in poorly accessible and/or mountainous environments and more often than not at low level. Weather, too, is not always the pilot's friend: reduced altitudes and low cloud ceilings often call for adapted flight levels.

Another flight safety enhancing module is MT's Satellite Radar. It displays the ground-based meteorological radar (precipitation echo) of the European network of radar systems for central Europe. This grid of ground-based radar stations offers a graphic representation of the entire flight path without blanked-out areas.

Representation of a barely visible power line and mast

Automatically updated data are uploaded into VisonAir via SatPhone rendering weather radar onboard the helicopter obsolete. The semi transparent overlay image allows for simultaneous view of the current flight situation and the moving map.

In a modern helicopter, e.g. Moving Terrain's MT TAWS (Terrain Alert Warning System) is a highly effective tool to support the flight crew. The helicopter's altitude is constantly put in relation to the digital terrain model and dangerous terrain shows up on the display as an overlay over the basic map. Green, yellow and red colors mark the degree of the hazard, and the pilot can decide immediately whether to stay at the current altitude, e.g. in a valley or not.

Currently, comprehensive obstacle databases for the helicopter's normal operational environments are still lacking. Engineers depend on the different countries' Aeronautical information publications (AIPs). The AIP Germany states in ENR 5.4 Air Navigation Obstructions - Enroute:

- 1.1 General
  All air navigation obstructions (listed according to the Federal Lands) and additionally the positions of cable cars which are known to the DFS Deutsche Flugsicherung GmbH are published in AIP Germany ENR 5.4.
- 2.2 Contents
  This list contains all obstructions to air navigation with a height of more than 328 ft (100 m) GND as determined by the DFS Deutsche Flugsicherung GmbH. In addition, the list contains all obstructions with a height of 200 ft (61 m) GND known to the Bundeswehr Air Traffic Services Office.

Beautiful theory! And the commonly used ICAO 1.500000 aviation chart depicts topographical characteristics, legal items, radio beacons and obstacles such as masts, antennas etc. However, it does not show power lines.

Treading New Paths

Stefan Unzicker, CEO Moving Terrain, wanted more. He wanted the obstacles visible on his systems – in the Relief Dynamics view. And he wanted it in a way befitting the helicopter's mission profiles with everything relevant about an obstacle visible, usable in every day operations and with clear and easily understandable symbols. But where can one find such a database?

Moving Terrain turned to Switzerland where the Swiss Army and the Federal Bureau for Civil Aviation (BAZL) created just that database. The company purchased the data and integrated them into Relief Dynamics.

One aim was to show obstacles so early that the crew has enough time to acknowledge it and implement appropriate measures. The solution is to first show an obstacle when 5 nm away from it. At this distance no realistic and to-scale depiction is necessary, and masts of cable cars or power lines are simply shown as red blocks. At a distance of 1 nm "real" masts with the lateral extensions are shown, between the masts four yellow lines represent the cables. Similar symbols exist for other obstacles: antennas, wind turbines with turning rotors etc. For tall antennas or masts even the anchoring cables are depicted. Illuminated obstacles have a yellow "hat".

First Test Flight

The first test flight with a helicopter was scheduled for October 21, and 4ROTORS was invited to attend.

The weather was perfect with visible good and a relatively low ceiling: MT VisionAir would have to prove what it can do. At 1100h, pilot Günter Feiner landed the EC120.

In our briefing we set out the flight route from Sulzberg (Moving Terrain's home) passing Lake Constance towards Säntis in Switzerland. Unzicker had selected points along the route where he wanted to approach obstacles.

"Royal Bavarian" EC120

D-HBIO with us in it took of at 1000 zulu. This EC120 was already equipped with an MT VisionAir, and Unzicker transferred the routing to the onboard system. Every VisionAir can be used independently of the aircraft power supply, as batteries provide between 2 and 4 hours running time. Feiner had the routing available on his system, Unzicker held the test system in his hand. Relief Dynamics was selected, and it showed the terrain in front of us in color and from a bird's eye view.

I sat on the back seat and had an unobstructed view of the display. The 3D image it showed was impressive, the similarity between the landscape's contours and their representation on the display was astounding.

And then we enter Swiss airspace and the database kicks in. Almost immediately we see lines and symbols pointing out obstacles to us. Stefan Unzicker directs Günter Feiner to a number of targets: there is the power relay station, next is the tall antenna. We head towards a hill covered by a dense forest. According to the VisionAir, a power line should be at the hill's foot that the eye does not see. Only when we are very close do we discover it.

We fly into a valley. On the right side an almost vertical cable car is supposed to be going up the mountain. VisonAir shows it on its display. We do not see it. Only when we fly by directly next to it can we see its structure at the top of the valley as it disappears into the clouds.

Our flight went on like that. We would approach obstacles that the display showed, that were there in reality, but that we did not see until at a distance (that could be) too close for comfort.

On the way home, Stefan Unzicker handed me his unit. The viewer's perspective, the pitch if you will, can be selected by clicking on a button, and that is what I did to accommodate my seating and viewing position. We flew over Altenrhein, Lake Constance and headed towards Sulzberg again. The entire time, the system worked perfectly from the back seat as well, reception was without problem thanks to the built-in GPS antenna and the newest SiRF IV technology, despite the fact that the unit was not connected to a power source and had no clear line of sight towards the sky and satellite.

Conclusion

The test flight went without any glitches or error messages; every real obstacle was on the display long before we could see it. And the decision to show obstacle details and size in the aforementioned two-step approach (5 nm vs. 1 nm) does in no way diminish the system's effectiveness.

Günter's and my assessments are identical: The obstacle depiction on the VisionAir is a definite plus for flight safety and can help helicopter crews to stay on the safe side in difficult situations.

For helicopter flying in general and to improve flight safety it is worth having obstacle databases of this quality available in all countries and not only in Switzerland.

Wulf Bertinetti


Marked clearly in red and yellow on the VisionAir display: the transformer station and power lines