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## The Hub of the Helicopter Industry

### Farnborough Day Two: Bell's X-Hawk Promise Is Future Oriented, Urban Warfare Aimed

Bell's take on the X-Hawk goes beyond the immediate news interest of the day – a vehicle for urban warfare.

‘This is a new category of vehicle, the fancraft,’ says Jon Tatro, director advanced concept development.

‘It's as significant – and as emerging – as tiltrotor was 20-30 years ago,’ he says.

As such, the fancraft X-Hawk and the concepts behind it are a foundation for something that takes rotorcraft technology in a new direction.

Helicopters (and tiltrotors) cannot ‘shroud’ or protect their rotors, a simple fact that means **they cannot operate close to structures without facing imminent destruction.**

As urban terrorism has evolved, however, the need for a transport system that can ‘work’ in the kinds of confined spaces involved – a flying system, one capable of being off the ground and flying clear of the threats in the environment – has become more and more pressing.

‘Ground commanders in Iraq are crying out for an alternative to the HUMVEE or Bradley or Strykers. We don't have one. We can't get the Little Bird in there. We can't provide lift for them.’

Fast forward now to Israel where an entrepreneurial technologist (perhaps visionary is also applicable) **has for some time been working with an old concept that didn't work too well at the time, to find ways to ensure it does now.**

The concept can loosely be called the flying Jeep, or even (inevitably) a Jetson-mobile, basically a shrouded fan device that provides enough thrust to allow it to maneuver, lift and work without obtrusive rotors.

Here is not the place to dissect the many attempts in the past (Frank Piasecki was at one time the acknowledged experimenter in the field) to do this.

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Suffice to say that until Dr Rafi Yoeli - President of an Israeli entity called Urban Aeronautics - comes along, progress has been minimal.

Yoeli has a couple of patents to fix the heritage problems, the efficacy of which appeal to Bell's X-works technologists and the rest, as they say, is history – or the future.

Put simply, Yoeli's work centers on the design of both the outlets and the inlets of the lift fan mechanism together.

Turns out that **if the inlet exhaust mechanism moves in synch with the outlet mechanism (think slats on a Venetian blind that can be slanted to direct airflow), great and different things happen.** The speed and stability problems which limited flying Jeeps before goes away.

That's only half the problem, however. When such a lifting body moves forward, air builds up in the back of the fan.

Again Yoeli has an answer – equip the forward edge of the duct around the lift fan with programmable louvers.

Air then is free to circulate and escape the trap. Combine the two thought processes and the X-Hawk is born (at least in conceptual imagination) – a military urban transport system combining speed, agility and stability.

Bell - it goes without saying – and Yoeli - worked pretty hard on their due diligence before decided to mount a partnership, but earlier this summer they did.

The result here at the show is the futuristic X-Hawk, a 12-place APC capable of a wide range – very wide range, almost a range limited by imagination – of tactical applications.

How far is this going? The marriage between entrepreneur and US 'skunk works' looks solid right now.

The mock-up unveiled here is fabulous to look at and was attracting more comment and speculation than anything else the company has on display.

**In the real world, however, funding has been identified (currently through the US Navy's Office of Naval Research, about \$500,000) and the missionary work is underway to get buy-in from the myriad service elements that will have to be enlightened as the process continues.**

A third scale powered wind tunnel mock-up is the next substantive job, beyond that gradual definition and development of the idea as the concept takes hold.

On the face of it X-Hawk seems an extremely attractive idea.

The idea of supplying 'six degree of freedom' lift in confined environments is inherently compelling. The idea, too, of developing rotary wing into new fields like this is also something that has needed doing. But most pressing of all is the requirements that may eventually emerge for it: the ability of US combat teams to work where they can't now – and where common sense tells you they must as the trends point to expansion of urban warfare.

- David S. Harvey

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