



# Daisybell comes to North America

New technology brings gas-powered heli-delivery to avalanche control

By Jim Bay

**D**aisybell® is one of the latest weapons in the avalanche control arsenal. Developed in France by TAS (Technologie Alpine Securitie), the manufacturers of the Gazex® avalanche control systems, the Daisybell is the first mobile avalanche control system using explosive gas-air blast technology.

Gazex avalanche control systems are well known in the avalanche industry and are in common use throughout Europe with some 500 customers and over 1800 units in place worldwide. In Canada, the BC Ministry of Transportation's avalanche programs have utilized the Gazex system as a key and regular method for avalanche control for many years, with 22 exploders throughout Kootenay Pass and three on the Duffey Lake road.

The Gazex is a fixed installation where a propane/oxygen mixture is remotely ignited inside a specialized steel tube, producing a powerful air blast shock wave directed at the avalanche starting zone. With the wide acceptance of this system, a mobile solution using similar technology seemed to be the next step. During the winter of 2008/09, after two years of extensive development and testing, the first Daisybells were used operationally in Europe. One unit was also sent to Canada for demonstration purposes.

### **Description**

The Daisybell is a single unit consisting of a steel cone/bell, gas supply and control system which is carried suspended on a long line (15 – 30m) below a helicopter. The cone is injected with a specific mixture of oxygen and hydrogen (hydrogen was chosen for this application since its low density allows it to remain inside the cone) while the helicopter approaches the avalanche start zone. When the Daisybell is in position, the gas mix is ignited and the subsequent explosive blast is directed by the cone down towards the snowpack. The shock wave affects a wide area with a powerful air blast, which has proven to be one of the most effective means of triggering avalanches.

The inertia of the bell and a special damping sling reduces the "bounce" associated with the blast to the point where it is barely felt inside the helicopter. The Daisybell is radio controlled from inside the helicopter by the technician/operator using a control box designed to be very safe and simple to operate. The optimum distance above the snow for the Daisybell is between 5 and 10 metres. Positioning is facilitated by a laser rangefinder which provides a visual measure of distance above the snow to the pilot and technician/blaster.

The blast effect can be optimized for different snow conditions by varying the height above the snow surface. The explosive equivalent of the blast is comparable to that of a 1.5 cubic metre Gazex exploder or 270mb at 4 metres below the Daisybell (25mb is considered sufficient to trigger an avalanche). With pilots experienced in flying the Daisybell and familiar with the area being controlled, the movement from one target to the can be very fluid and efficient.

The key benefits that Daisybell offers are:

- Simple, safe operation
- Air blast effectiveness
- No solid explosives

- No explosive storage or licensing issues
- No explosive residue in sensitive areas
- No affect/damage to the earth/rock in shallow snowpack areas
- No duds or tobogganing explosives
- Efficient—time between shots is ~20 seconds
- Easily transported to different operational areas
- Good capacity—with standard Canadian configuration ~30 shots on one set of gas bottles
- Economical—price per charge is very reasonable and helicopter time is lower (no waiting for fuses to burn)

This past winter, over a dozen Daisybell units were used extensively in Europe during a very active avalanche season. The reports were very favourable with one of the units firing over 3000 shots. In Canada, Daisybell was introduced to the avalanche community at the Whistler ISSW where a demonstration was conducted on Whistler Mountain. In January 2009, a demonstration tour was carried out in Southern BC with visits to Hope, Revelstoke, Rogers Pass, and Kicking Horse Mountain Resort in Golden. A video of the KMHR demonstration can be seen at:

[http://www.dailymotion.com/video/x8e6sl\\_daisybell](http://www.dailymotion.com/video/x8e6sl_daisybell).

Overall the feedback from participants was positive with many people impressed at the strength of the blast and the potential for areas where the use of conventional explosives would be difficult. There were concerns raised about the weight of the device, which was ~ 580 kg (1300 lbs). In Europe where the Alouette B3 helicopters are commonly available this weight is not such a problem.

Over the course of the summer, the manufacturer (TAS) responded to feedback from both Europe and Canada and made a number of significant improvements to the Daisybell such as:

- Reducing the weight to ~450kg (990lbs) fully loaded. This reduced weight will make the unit much easier for the B2 and similar helicopters to handle.
- Increased explosive power using less gas through improved gas mixing.
- Increased number of shots on one set of gas bottles (30 shots).
- Shorter gas fill time prior to firing (five seconds) for greater efficiency.

DaisyBell offers another progressive option for avalanche control requirements in North America, with quick, mobile access to remote locations where permanent control systems are not yet installed, or where control requirements are variable and/or intermittent. The mobility by helicopter deployment and simple transport to any location via truck or trailer gives the system great flexibility for a variety of applications. Further details on the Daisybell can be found at [www.groupemnd.com](http://www.groupemnd.com) under the TAS link. For more local information, contact the Canadian distributor, Avatek Mountain Systems Inc. Phone 250.344.2212, or e-mail [info@avateksystems.ca](mailto:info@avateksystems.ca).

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