



## NRC Licensee Set to Give Fire-Fighting a Boost

The following story illustrates the success of one of NRC's technology license holders. In 2002-2003, NRC established 48 new licenses for its technologies, and gained over \$7 million in royalty payments from license holders, revenue which is re-invested into NRC R&D.



The human and economic costs of fire in Canada are extremely high. The most recent comprehensive figures place the total annual cost at CAN\$11 billion. New technology developed by the NRC Institute for Research in Construction (NRC-IRC) and recently licensed to Montreal-based FireFlex Systems holds the prospect of reducing these costs dramatically. The technology also promises new opportunities for FireFlex as it expands its product offering.

FireFlex is currently fine-tuning a revolutionary new fire suppression system that uses compressed-air foam (CAF) instead of water to fight fires. In appearance, CAF best resembles shaving cream. Structurally, CAF-systems produce a blanket of foam with extremely small (micron-sized) and strong bubbles that are excellent for putting out fires and will cling to vertical surfaces, providing protection from the fire. CAF is produced by mixing foam concentrate,

compressed air and water. When the foam is released it comes out with enough force to penetrate fire plumes and reach the base of the fire. As a result, the system puts out fires extremely quickly. CAF also uses very little water, a fact which makes cleanup easier and reduces the chance of structural damage caused by excess water.



Although CAF technology has been in existence since World War Two and used widely for forest-fire fighting since the 1970's, until recently, broader applications for CAF simply didn't exist. According to NRC-IRC researcher George Crampton, this fact stood out when, in the course of evaluating fire suppression systems available for use in airplane hangars, researchers went looking for a CAF-based system. In a memorable moment, NRC-IRC researchers realized that no one had adapted CAF technology for fixed pipe and sprinkler systems, the standard throughout commercial-grade buildings. The next step was easy; researchers decided to build their own system.

Crampton noted that the use of CAF for firefighting is much more straightforward. "In these systems, there is a straight hose and a simple nozzle at the other end which sends out a thick rope of foam. Because the system is so simple, there is really no need to closely monitor how foam is generated and how it expands and behaves in the hose. But, in fixed piping systems, CAF had never worked because the foam would break down as it hit various obstructions such as pipe elbows." He also commented that, while there are other non-CAF foam systems on the market, they produce weak and "slushy" foam easily dissipated by intense fires.

In the end, NRC-IRC researchers created a new CAF-based solution based on a thorough understanding of how foam behaves in piping systems and the exact proportions of materials required to generate foam. "It stood out as an engineering challenge. One has to understand things such as the role of pipe diameter, flow speed, volume of material in the pipe. Once you have these parameters down, it becomes fairly easy to come up with a formula to describe foam behaviour in the pipe and to calculate the amount of air, water and concentrate required to generate the required foam," Crampton commented.



FireFlex's CAF-based system controlled a simulated power transformer fire in less than 45 seconds and fully extinguished the blaze in under 1.5 minutes. A traditional "deluge" type uses up to 10 times the water flow and is capable of extinguishing transformer fires in approximately 4 minutes. This tremendous water usage creates a large amount of hazardous waste caused by water mixing with contaminants from the transformer.

The system also encompasses patented technology for a special rotary nozzle, which is now being manufactured by FireFlex along with other parts for the system. The new nozzle was necessary to be able to distribute the foam widely and evenly across the target area.

Jean-Pierre Asselin, Vice-President of FireFlex, noted the company has continued to pursue joint R&D with NRC-IRC to see how the technology can be extended to different classes of fires and is waiting certification from several standards bodies before the CAF system can formally enter the marketplace.

Asselin stressed the importance of the licensing agreement in helping the company diversify its product offering. "We have developed a completely new cabinet system, new nozzles and new hydraulics. As part of another unrelated R&D project, we had created a new electronics control panel. We were able to create a good fit with our earlier R&D investments and the new technology and, as a result, have a whole new product line." He noted that the new technology will allow FireFlex to become a primary manufacturer of fire suppression equipment such as nozzles and piping based upon designs created for the CAF technology, a significant step forward for the company and a boost for the local economy.