mines before manual deminers are required to enter a mined area.

- *Mechanical reproduction mines*
  The effective testing and evaluation of mechanical mine clearance equipment cannot be done with real mines in a real minefield. The presence of live mines that may have been thrown into places previously cleared or dug into the ground by the action of the machine can create an unknown hazard. With this in mind, the CCMAT developed a series of non-explosive simulated mines whose fuses react to the action of the machine being tested in the same way a real mine would. This has allowed the CCMAT to develop testing procedures for a number of machines. The simulated mines are now manufactured by Amtech Aeronautical Ltd. of Medicine Hat, Alberta and have been sold to interested parties in the United States and the United Kingdom.

- *New and improved explosives for neutralizing mines*
  The CCMAT tested and evaluated FIXOR, an explosive developed by MREL Specialty Explosive Products Ltd. of Kingston, Ontario. FIXOR can be used to neutralize mines and UXO uncovered as a result of mine clearance operations. It consists of two non-explosive components that are mixed on-site. This two-part composition allows FIXOR to be shipped and stored less expensively than conventional explosives and its distribution and use in the field to be effectively controlled. Following successful testing at the CCMAT, FIXOR was demonstrated to deminers in Kosovo. The DFAIT Mine Ban Initiatives Program provided funding for a supply of the new explosive, and training in its use, for the Thailand Mine Action Centre. Use of FIXOR among mine clearance operations is growing quickly, with organizations such as RONCO and Handicap International among those now using it.

- *Protective equipment for mine clearance*
  The CCMAT has collaborated with the United States in the development of test and evaluation methodology for protective demining equipment. A rigorous research program was conducted on the nature of a mine blast and its means of causing injury. This information was used to design a reliable test methodology applied to the evaluation of the Humanitarian Demining Ensemble manufactured by the Canadian company, Med-Eng Systems Inc. of Ottawa. The test

Testing a Humanitarian Demining Ensemble, developed by Med-Eng Systems Inc., using automotive crash test dummies.

DRES Photo Instrumentation Group