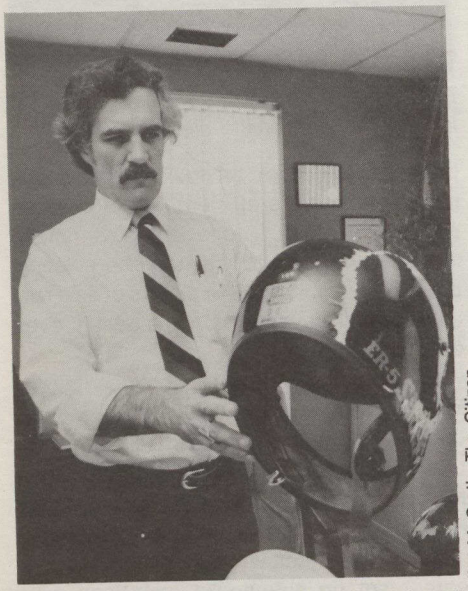
Safety engineers' expertise saves lives

Biokinetics & Associates Limited, an Ottawa, Ontario engineering firm that specializes in a wide range of safety-related research, is making important contributions in the testing, evaluation and development of improved life support and protective systems.

The company, which has developed expertise as "safety engineers", was formed in 1975 by Jim Newman, a professor at the University of Ottawa at the time, who was involved in research on hockey helmets and other protective headgear for which there were no design or manufacturing standards.



Pat McGrath, The Citizen

Jim Newman, president of Biokinetics & Associates Limited, holds a battered helmet.

Since 1977 when Mr. Newman began to run the firm on a full-time basis, Biokinetics has grown into a $500 000-a-year business, based mainly on contract research.

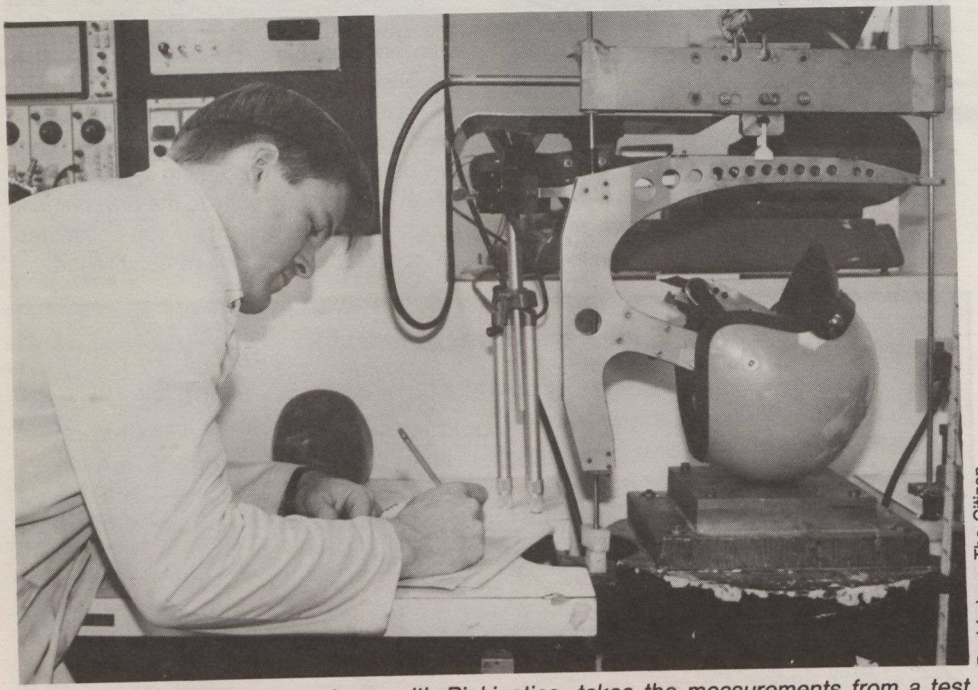
Although Biokinetics itself has only eight employees, the firm works closely with other engineering firms and universities, including Ottawa's TES Limited and David Engineering Limited and the Universities of Ottawa, Waterloo and California.

Seatbelt studies

In the past three years, Biokinetics has been awarded a series of Transport Canada contracts worth almost $1 million to research ways to minimize or prevent automobile accident injuries, especially for drivers and passengers who wear seatbelts.

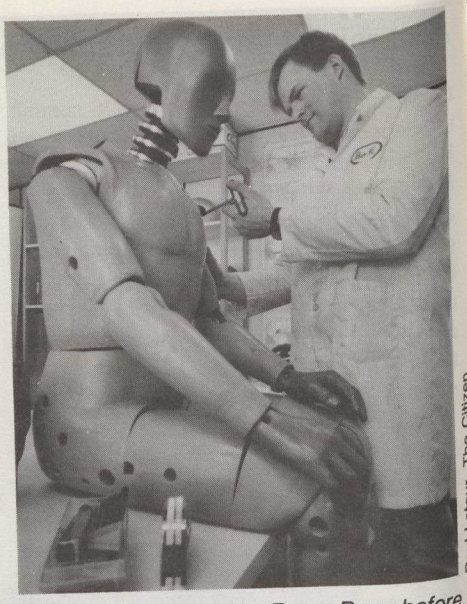
Much of the existing data on how the human body is injured in head-on collisions or other car accidents is based on research in the United States, where very few states have laws requiring drivers to wear seatbelts. In Canada, all the provinces except Prince Edward Island and Alberta have legislation requiring the use of seatbelts.

Although seatbelts often save lives by keeping drivers and passengers from going through the windshield, Mr. Newman says their design could be improved to prevent three common types of damage: facial injuries from hitting the steering wheel; chest injuries in the upper torso from the over-the-shoulder section of the seatbelt; and abdominal injuries that occur when the lap portion of the belt slips over the hipbones onto the unprotected abdominal tissue.



Paul Latour, The Citizen

Roger Perry, a research engineer with Biokinetics, takes the measurements from a test to measure a helmet's ability to absorb impact.



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A dummy is adjusted by Roger Perry before a crash simulation test.

In crash simulations, the researchers place rubber and metal crash dummies that are instrumented to measure forces on the head and body in motor vehicles and crash them against barriers at predetermined speeds.

To test for facial injuries, bone plaster used by surgeons is fitted to the aluminum heads of the dummies to emulate the structure and strength of facial bones.

In conjunction with Davis Engineering, Biokinetics has also designed a mechanical chest for the dummies to measure the stress from a seatbelt during a collision. Since crash dummies don't have organs, which play an important role in how the chest responds to impact, the Biokinetics team has devised the equivalent of shock absorbers to replicate the role of the organs in cushioning impact.

Using data Transport Canada has collected from real accidents, these accidents can be reconstructed and the dummies' "injuries" compared to the actual injuries sustained by the real accident victims to test the accuracy of the monitoring and measuring systems.

Once the Biokinetics researchers have determined the procedures and equipment that can accurately predict the effects of collisions on drivers and passengers wearing seatbelts, Transport Canada can have crash dummies and other testing equipment built to those specifications.

More importantly, the firm's work could lead to safer designs of seatbelts and car interiors.

"We're not going to be satisfied just to demonstrate that we can design a crash dummy that can imitate real injuries to real people," said Mr. Newman. "We want to