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# Complex Multi-Chamber Airbag Performance Simulation Final Report CRADA No. TSB-961-94

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January 22, 2018

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This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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# Complex Multi-Chamber Airbag Performance Simulation

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## Project Accomplishments Summary CRADA No. TSB-961-94

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Date: September 12, 2000

Revision: 1

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### A. Parties

The project is a relationship between the Lawrence Livermore National Laboratory (LLNL) and Advanced Safety Concepts, Inc.

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Lawrence Livermore National Laboratory  
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Livermore, CA 94550  
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Advanced Safety Concepts, Inc. (ASCI)  
227 East Palace Avenue; Suite 0  
Santa Fe, NM 87504  
Philip Kithil  
Principal Investigator  
Tel: (505) 984-0273  
Fax: (505) 984-9354

### B. Background

The purpose of this small business CRADA was to evaluate the performance of new airbag concepts which were developed by Advanced Safety Concepts, Inc. (ASCI). These new airbag concepts, if successful, could have major potential savings to society in terms of fewer injuries, lost time and lives.

### C. Description

This evaluation could not be reasonably accomplished by ASCI alone either through experiments or calculations. The performance simulation of the ASCI complex multi-chambered airbag system was scheduled to be accomplished using newly developed coupling between the LLNL nonlinear large deformation finite element code DYNA3D and the rigid body crash victim simulation code MADYMO.

PAS

Successful completion of this project would give the small business the necessary information to modify and/or improve their airbag design using linked software that was newly developed and not available to the public. The project plan was for LLNL to simulate the airbag performance in a 30 m.p.h barrier crash and then assist ASCI in the simulations of 10 and 20 mph crash simulations. This crash range would provide airbag performance data in the low to high severity range of expected airbag use.

#### **D. Expected Economic Impact**

This work would enable rapid airbag design refinements by Advanced Safety Concepts (ASCI) which were based on results of the crash simulation. These refinements would allow ASCI to proceed with their product development of a new airbag design for improving occupant protection in auto accidents and establish them as leaders in their industry segment. At the time of the CRADA, occupant injury costs totaled more than \$50 billion annually. An improved airbag restraint design that could be easily retrofitted on existing non-airbag equipped cars and installed in new vehicles could substantially reduce medical costs, injuries and allow injured occupants to quickly return to the work force.

#### **E. Benefits to DOE**

This project provided LLNL an opportunity to test and refine newly developed software which would link the LLNL nonlinear large deformation finite element code DYNA3D and the rigid body crash victim simulation code MADYMO. This linkage was unique to LLNL and the application to the complex airbag design would provide an opportunity to demonstrate and verify the software on a complex proprietary airbag design. This would help position LLNL as a state-of-the-art airbag modeling facility and would enhance on-going research in occupant airbags and vehicle interaction during a crash event.

The DOE would benefit through the continued use and refinement of computer codes developed for the weapons program thus maintaining core expertise.

#### **F. Industry Area**

Automotive

#### **G. Project Status**

This project was cancelled in May 1995 before any work could be completed.

**H. LLNL Point of Contact for Project Information**

University of California  
Lawrence Livermore National Laboratory  
7000 East Avenue,  
Livermore, CA 94550  
Gregory Kay  
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Telephone: 925/422-8680  
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**I. Company Size and Point(s) of Contact**

Advanced Safety Concepts is a privately held company with annual sales of less than \$10 million. The company employs less than 50 people.

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Santa Fe, NM 87504  
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**J. Project Examples**

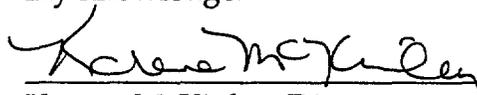
There were no project examples because the project was cancelled before any work was completed.

**K. Subject Inventions**

This small value contractual mechanism did not anticipate any generation of Intellectual Property (IP) including subject inventions. The LLNL contributors and the company participants both indicate that no new intellectual property was generated.

**L. Release of Information**

I certify that all information contained in this report is accurate and releasable to the best of my knowledge.

  
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Karena McKinley, Director  
Industrial Partnerships  
and Commercialization

9/25/00  
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Date