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PNGV Lightweight Materials Final Report CRADA No. TC-0296-92-a

P. Raboin, M. S. Rashid

March 14, 2018

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PNGV Lightweight Materials

Final Report CRADA No. TC-0296-92-a

Date: December 17, 1996

TACT: MAT

Revision:

A. Parties

The project is a relationship between the Lawrence Livermore National Laboratory (LLNL) and General Motors Corporation (GM).

University of California
Lawrence Livermore National Laboratory
7000 East Avenue, L-795
Livermore, CA 94551

General Motors Corporation
30500 Mound Road
P.O. Box 9055
Warren, MI 48090-9055

B. Project Scope

Lawrence Livermore National Laboratory and General Motors Corporation worked together to develop materials and processes that will reduce the weight of automobiles produced by GM. This development also maintains the crash worthiness and performance standards of present day vehicles. This results in large increases in fuel efficiency and therefore, reductions in fuel consumption. Automobile body weights are reduced by improving the uniformity and, hence the formability of high-strength steel. With advanced manufacturing technologies, the U.S. automotive industry and its suppliers will be able to produce lightweight components in this country, as opposed to offshore.

C. Technical

Milestones and Deliverables:

List the complete set of milestones for all phases of the CRADA. Continue on a separate page if Report any changes from the original CRADA or previous quarterly report on the CRADA Change Form.

	Completion Date:	
	Scheduled	Actual
1a) Identify and evaluate new candidate alloys.	03-93	03-93
1b) Select alloy for Task 3.	09-94	08-94
2a) LLNL will develop codes for single mesh process modeling.	03-94	05-94
2b) GM provides geometric data of 3D plate casting.	12-93	07-93
2c) LLNL marries mold filling and solidification codes into a single process model.	03-94	05-94
2d) LLNL incorporates MMES quality criteria into process model.	03-94	03-95
2e) LLNL models a 3D sand cast plate and makes material property measurements to support the models. LLNL will train GM in the use of the models	03-94	08-94
2f) GM and LLNL interact to explore gating and nicer design changes.	03-94	08-94
2g) GM and LLNL write separate reports.	09-94	12-94
3a) LLNL models 3D sand cast plate of modified alloy	03-95	03-95
3b) GM selects casting part for bench marking experiment.	03-95	12-94
3c) LLNL models casting of GM part and trains GM personnel.	03-95	03-95

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3d) GM and LLNL have task 2f interactions for GM cast part.	.03-95	03-95
3e) GM and LLNL write separate reports.	04-95	Canceled
3f) All the labs and GM select an alloy for tasks 4 and 5.	04-95	Canceled
3g) LLNL procures a computer workstation for casting modeling.	09-94	08-94
4,5) Advise and participate in GM casting evaluation of Aluminum Alloy.	05-96	Canceled

D. Partner Contribution

GM's in-kind contribution is consistent with our CRADA agreement because they met their milestones.

E. Documents/Reference List

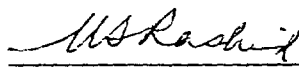
Quarterly Reports of the following dates:

7/14/93, 10/16/93, 2/9/94, 3/31/94, 5/18/94, 6/30/94, 9/30/94, 6/30/95


F. Acknowledgment

Participant's signature of the final report indicates the following:

- 1) The Participant has reviewed the final report and concurs with the statements made therein.
- 2) The Participant agrees that any modifications or changes from the initial proposal were discussed and agreed to during the term of the project.
- 3) The Participant certifies that all reports either completed or in process are listed and all subject inventions and the associated intellectual property protection measures attributable to the project have been disclosed or are included on a list attached to this report.
- 4) The Participant certifies that if real property was exchanged during the agreement, all has either been returned to the initial custodian or transferred permanently.
- 5) The Participant certifies that proprietary information has been returned or destroyed by LLNL.


 Dr. M.S. Rashid
 General Motors Corporation

12/2/97
 Date


 Peter Raboin
 Lawrence Livermore National Laboratory

3/4/97
 Date

- Attachment I - Final Abstract
 Attachment II - Project Accomplishments Summary
 Attachment III - Final Quarterly Report

PNGV Lightweight Materials

Attachment I
Abstract
CRADA No. TC-0296-92

Date: January 10, 1997

Revision:

Lawrence Livermore National Laboratory and General Motors Corporation (GM) worked together to develop materials and processes to reduce the weight of automobiles produced by GM. The goal was to maintain the crash worthiness and performance standards of present day vehicles. Meeting the objective could result in large increases in fuel efficiency and therefore, reductions in fuel consumption. Automobile body weight could be reduced by improved uniformity and hence, the formability of high-strength steel. With advanced manufacturing technologies, the U.S. automotive industry and its suppliers will be able to produce lightweight components in this country, as opposed to offshore.

PNGV Lightweight Materials

Project Accomplishments Summary (Attachment II) CRADA No. TC-0296-92-a

Date: December 17, 1996

Revision:

A. Parties

The project is a relationship between the Lawrence Livermore National Laboratory (LLNL) and General Motors Corporation (GM).

University of California
Lawrence Livermore National Laboratory
7000 East Avenue, L-795
Livermore, CA 94550

General Motors Corporation
30500 Mound Road
P.O. Box 9055
Warren, MI 48090-9055

B. Background

Lawrence Livermore National Laboratory and General Motors Corporation worked together to develop materials and processes that will reduce the weight of automobiles produced by GM.

C. Description

The goal is to maintain the crash worthiness and performance standards of present day vehicles. Meeting the objective will result in large increases in fuel efficiency and, therefore, reductions in fuel consumption. Automobile body weight will be reduced by improving the uniformity and, hence the formability, of high-strength steel. With advanced manufacturing technologies, the U.S. automotive industry and its suppliers will be able to produce lightweight components in this country, as opposed to offshore.

D. Expected Economic Impact

The competitiveness of the U.S. automotive industry will be markedly enhanced by this program.

E. Benefits to DOE

The demonstration projects will utilize and enhance Defense Program processing (casting, forming, heat treatment, and thermal spraying) and process modeling expertise.

F. Industry Area

Transportation.

G. LLNL Point of Contact for Project Information

Peter Raboin
phone: (510) 423-4097
fax: (510) 422-1583

H. Company Size and Point(s) of Contact

Dr. M.S. Rashid
phone: (313) 986-0949. General Motors has 745,000 employees worldwide.

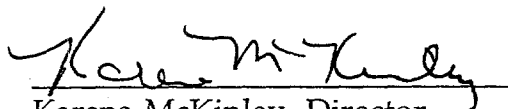
Release of Information

I have reviewed the attached Project Accomplishment Summary prepared by Lawrence Livermore National Laboratory and agree that the information about our CRADA may be released for external distribution.

M.S. Rashid 12/2/97
Dr. M.S. Rashid Date
General Motors Corporation

RELEASE OF INFORMATION

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



Karena McKinley, Director
Industrial Partnerships
and Commercialization

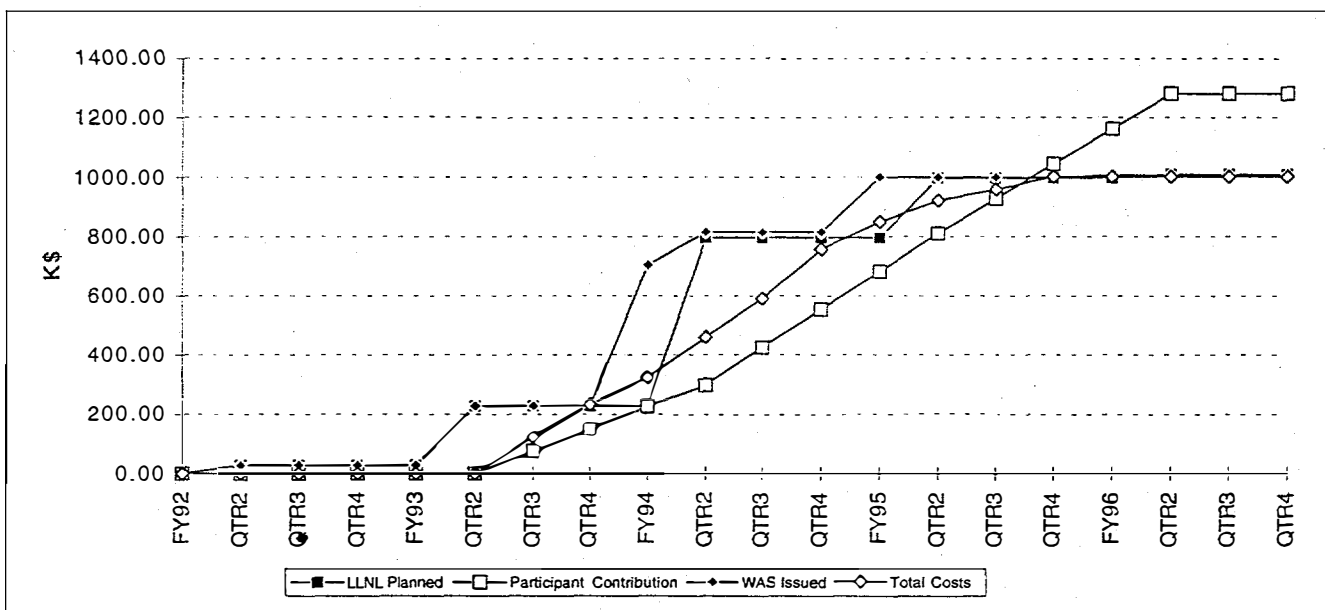
1/15/99
Date

**Lawrence Livermore National Laboratory
Final Quarterly Report Attachment III**

Title: PNGV Lightweight Materials
 Participant: General Motors
 DOE TTI No.: 92-MULT-017-B2
 CRADA No.: TC-0296-92-A
 TACT: MAT
 Account Numbers: 4784-23 to 24 (EMATT) 7615-32 to 33 (EMATT)
 Accounts Closed: #####
 Approved Funding Profile (SK)

Reporting Period: 07/01/95 - 09/30/96
 Date CRADA Executed: 03/26/93
 DOE Approval Date: 03/22/93
 Scheduled Ending Date: 03/26/96
 Project Completed: 09/30/96
 B & R Code (S): DP0301
 35DP03

	FY92	FY93	FY94	FY95	FY96	Total
LLNL Planned	27	200	568	203	12	1010
Participant In-Kind	0	150	405	490	235	1280
Participant Funds-In	0	0	0	0	0	0
WAS DP0301	27	200	478	183	24	912
WAS 35DP03	0	0	110	0	-14	96
Total Costs	0	232	524	245	0	1000



DP0301	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	FYTD	904
FY92	0	0	0	0	0	0	0	0	0	0	0	0	0	
FY93	0	0	0	0	0	1	11	33	79	33	29	45	232	
FY94	40	35	17	36	33	63	39	37	36	50	33	21	440	
FY95	25	38	31	20	23	18	14	7	14	34	3	6	233	
FY96	0	0	0	0	0	0	0	0	0	0	0	0	0	

35DP03	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	FYTD	96
FY92	0	0	0	0	0	0	0	0	0	0	0	0	0	
FY93	0	0	0	0	0	0	0	0	0	0	0	0	0	
FY94	0	0	0	0	0	7	0	0	17	27	0	32	84	
FY95	0	0	0	12	0	0	0	0	0	0	0	0	12	
FY96	0	0	0	0	0	0	0	0	0	0	0	0	0	

STAFF w/phone:

Lab PI: Peter Raboin (510) 422-1583
 Resource Manager: Michelle Doggett (510) 422-3209
 DOE OAK: Jerry Scheinberg (510) 637-1653

Participant: Dr. M.S. Rashid (313) 986-0949
 DOE HQ: R. Peavy (202) 586-7907

Milestones and Deliverables:

List the complete set of milestones for all phases of the CRADA. Continue on a separate page if necessary.
Report any changes from the original CRADA or previous quarterly report on the CRADA Change Form.

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3e) GM and LLNL write separate reports.	04-95	Canceled
3f) All the labs and GM select an alloy for tasks 4 and 5.	04-95	Canceled
3g) LLNL procures a computer workstation for casting modeling.	09-94	08-94
4,5) Advise and participate in GM casting evaluation of Aluminum Alloy.	05-96	Canceled

Verification of participants' in-kind contribution was made in accordance with LLNL policy. Explain basis of verification:

Please initial: YES X NO

GM's in-kind contribution is consistent with our CRADA agreement because they met their milestones.

List any subject inventions by either party (include IL# for LLNL inventions), additional background intellectual property, patents applied for, software copyrights, publications, awards, licenses granted or reportable economic impacts.

None

Verification that all equipment and proprietary information has been returned to the initial owner or permanently transferred.

Please initial: YES X NO

Accomplishments

Describe Technical/Non-Technical lessons learned and other observations.
Summarize causes/justification of deviations from original scope of work.

See Final Report.

Reviewed by CRADA project Program Manager:

Date:

Reviewed by Karina McKinley, Director, LLNL/IPC:

Direct questions regarding this Report to IP&C Resource Manager, Carol Astler, at (510) 422-7618

Karina McKinley Date: 1/15/99