Project #: E-24-602
Center #: 10/24-6-R6898-0A0
Contract#: PMS18539
Prime #:
Subprojects ?: Y

Project unit: ISYE
Project director(s): BANKS J ISYE (404)894-2312

Sponsor/division names: GENERAL MOTORS CORP
Sponsor/division codes: 206 / 012

Award period: 900625 to 901214 (performance) 901214 (reports)

Sponsor amount
Contract value 28,551.00
Funded 28,551.00

Cost sharing amount 0.00

Does subcontracting plan apply ?: N

Title: EHANCEMENT AND REFINEMENT OF ISYE 6835 SIMULATION OF MANUFACTURING SYSTEMS

PROJECT ADMINISTRATION DATA

OCA contact: Don S. Hasty 894-4820
Sponsor technical contact ED ALEF, DIR., TECH. EDUCATION PROG. (000)000-0000
Sponsor issuing office ELAINE H. HAGE, BUYER (313)492-0048

GENERAL MOTORS CORPORATION
GM TECH CTR/ADV ENG STAFF MANUFACTURING BUILDING A-MD04
30300 MOUND ROAD
WARREN, MI 48090-9040

GENERAL MOTORS CORPORATION
GM STAFF PURCHASING GM TECHNICAL CENTER
7000 CHICAGO ROAD
WARREN, MI 48090-9035

Security class (U,C,S,TS) : U
Defense priority rating : N/A
Equipment title vests with: Sponsor X GIT

ONR resident rep. is ACO (Y/N): N/A supplemental sheet

Administrative comments -
SUBPROJECT IS E-24-605/ZHOU FOR $17,941. GM REQUIRES SEPARATE INVOICING FOR THE MAIN AND SUBPROJECT.
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GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

NOTICE OF PROJECT CLOSEOUT

Closeout Notice Date 03/27/91

Project No. E-24-602
Project Director BANKS J
Sponsor GENERAL MOTORS CORP/
Contract/Grant No. PMS18539
Prime Contract No. 
Title ENHANCEMENT AND REFINEMENT OF ISYE 6835 SIMULATION OF MANUFACTURING SYSTEM
Effective Completion Date 9/1/95 (Performance) 9/1/95 (Reports)
Center No. 10/24-6-R6898-0A0
School/Lab ISYE

Closeout Actions Required: 

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<th>Action</th>
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<tr>
<td>Final Invoice or Copy of Final Invoice</td>
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<tr>
<td>Final Report of Inventions and/or Subcontracts</td>
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<td>Government Property Inventory &amp; Related Certificate</td>
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<td>Classified Material Certificate</td>
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Comments

Subproject Under Main Project No.

Continues Project No.

Distribution Required:

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GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

NOTICE OF PROJECT CLOSEOUT (SUBPROJECTS)

Closeout Notice Date 03/27/91

Project No. E-24-602
Project Director BANKS J
Sponsor GENERAL MOTORS CORP/
Center No. 10/24-6-R6898-0A0_
School/Lab ISYE

Project # E-24-605
PD ZHOU C
AGR # PMS18539
Ctr # 10/24-6-R6898-0A1 Main proj # E-24-602
Sponsor-GENERAL MOTORS CORP
DEVELOPMENT OF ISYE
Start 900625 End 901215 Funded 11,281.00 Contract 11,281.00

Legend
1. * indicates the project is a subproject.
2. I indicates the project is active and being updated.
3. A indicates the project is currently active.
4. T indicates the project has been terminated.
5. R indicates a terminated project that is being modified.

Project # E-25-M46
PD INGRIM M
AGR # PMS18539
Ctr # 10/24-6-R6898-0A2 Main proj # E-24-602
Sponsor-GENERAL MOTORS CORP
DEVELOPMENT OF ISYE
Start 900625 End 900907 Funded 7,733.00 Contract 7,733.00
Activities stated in the contract include the following:

1. Develop an extra hour for the course. This extra hour will likely be a project requirement for students at GM. The project will probably be associated with actual manufacturing or assembly activities at GM plants or related divisions.

A meeting with Frank Gudan at the GM Technical Center lead to the following projects:

   a. An analysis of the assembly of vehicles with the doors on or with the doors off. The analysis will be based on a simulation of both methods of assembly. A "white paper" was suggested as the final result.

   b. A simulation of assembling in batches of colors or types of vehicles as one scenario and assembling at random as the other scenario. The interest is in total assembly time associated with each scenario.

   c. A simulation of high technology methods of vehicle transfer to final repair and shipping. One possible scenario is to use an AGVS to park the vehicles thereby saving labor and reducing exterior damage.

2. Visits to GM manufacturing sites in Atlanta. There are two manufacturing sites in Atlanta. They are the Lakewood Plant and the CPC Group Doraville Assembly Assembly Plant. Meetings will be held with the Industrial Engineering staffs at these plants to increase understanding of the activities that are amenable to simulation within a GM assembly plant.
Visits were made to the two facilities with the following results:

a. Lakewood Assembly Plant, July 23, 1990, Don Jones, Coordinator. This 3 1/2 hour visit began at the sheet metal entry into the body shop and went all the way to the drive-off to final repair. The buildup of the chassis was included as well as the assembly of the wheels into sets. Although the Lakewood Assembly Plant was largely labor intensive, it was possible to obtain a very thorough view of how automobiles are assembled. Mr. Jones had been at the plant for over 20 years and knew every segment of the assembly process in great detail. No question was left unanswered. He also had opinions on the proposed research topics. Unfortunately, the Lakewood Assembly Plant has been idled indefinitely as of early August.

b. CPC Group Doraville Assembly Plant, August 1, 1990, Mr. Holbrook, Coordinator. This 2 1/2 hour visit concentrated on the body construction. The Doraville Plant is much more automated than the Lakewood Plant. There are many robots in use at Doraville. Doraville represents the current operational thrust of GM. Opportunities for return visits to this facility exist.

3. Visit to GM Technical Center. A visit will be made to the GM Technical Center to meet with persons involved in simulation activities and advanced research projects. The meetings with those involved in simulation will be for the purpose of selecting a monitor for the class to be offered in the Fall of 1990 and to discuss the manner in which the class will be conducted. In addition, ongoing simulations at GM will be discussed to determine the level of project work that can be anticipated from the students. Meetings will be held with persons involved in advanced engineering to determine potential projects for simulation and to understand the context of those problems.

A visit to the GM Technical Center was held on July 20, 1990 with the following persons:

a. Frank Gudan, Advanced Manufacturing Engineering. GM uses simulation to a great extent. Six languages are approved. Mr. Gudan uses AutoMod II, and he showed some examples of his models and their graphics. Mr. Gudan is a possible monitor for the course provided that he gets a time slot approved for his activities.

b. Dr. Prakash Shrivatsaza, Advanced Product Engineering. Prakash is involved with many activities associated with the GM Technical Education Program. Prakash has laboratories in which simulation is performed. With respect to selecting monitors, Prakash stated that the $1,000 fee is not enough
because a great deal of time is required to conduct this task in an effective manner.

4. Increase quality of video offering. During the Fall of 1989 the course was taught according to the usual classroom style. However, the quality of the course can be much enhanced by preparing the materials for video based instruction. These improvements will be made in consultation with persons at the Video Based Instruction Center at Georgia Tech.

The following consultations were held:

a. Discussions with Dave Edwards, Director of the VBI Center. These discussions concerned more effective transmission of information for the students at satellite sites. A large improvement can be obtained by using the overhead camera focused on originals that are placed on the desk at the front of the classroom. In the Fall of 1989, transparencies were being shown on the screen, and the camera in the back of the room was picking up these transparencies, 1/2 screen at a time. This simple change alone (using originals placed on the desk) can make a large difference in what is seen by the students at a satellite location.

b. Meetings with Sam Chafin, Engineer, VBI Center. At the first meeting, Chafin met with Jerry Banks and John Jarvis, Acting Director of ISyE, to discuss the use of a site at the ISyE Building for VBI instruction. The ISyE site could be converted to a TV studio without extensive expenditures. The next meeting was held with Chafin at the ISyE site to determine the conversions that would be necessary. The ISyE site would be useful since a portable computer had to be carried to the VBI Center to give demonstrations in the Fall of 1989. Much better quality could be achieved in the ISyE site with permanent feed of computer output to video tape.

c. As it became clear that the ISyE site would not be ready for the Fall Quarter, investigations were launched into the types of boards that could be added to a personal computer to allow the feed of computer output onto a video tape. Boards cost in the neighborhood of $1500 up. The portable computer used in the Fall Quarter of 1989 was borrowed from the Material Handling Research Center at Georgia Tech, and costs around $4,000. Chafin suggested that the VBI Center be prodded to purchase a computer and the necessary board to convert the output to video tape. At about this time, the GM Technical Education Program announced that their Fall registration for ISyE 6835 was lower than anticipated and GM wanted to delay their participation until the next offering of the course. Hence, negotiations for a computer and board ceased at this point.