VIRTUAL PROTOTYPING IN THE AUTOMOTIVE INDUSTRY

COFFEE TALK
SILICON GRAPHICS: THE COMPUTER TOOLS OF THE FUTURE
See the "Investment News" Month #4
As we start turning the calendar pages of December, holiday is approaching fast and we get busy and excited in wrapping up the activities of 1994, celebrating the season with cheer and joy and anticipating the new year to come.

It is my pleasure to wish to all of you, the Brightest Holiday Season and a very Happy New Year! The halls are decked at Itasca Country Club and our December 13 meeting will look especially appealing to you under the warm glow of the Christmas tree decorations. The topic is appealing too: Virtual Prototyping in Auto Racing using Computer Simulation and Animation. The coffee talk will deal with Silicon Graphics Products and Media Tools. Quite interesting for engineers and computer enthusiasts alike! Plan to attend this last meeting of the year and make it part of your Holiday celebrations! Our social time will give you ample opportunity to meet your fellow SAE members, share ideas and thoughts and have a good time in the spirit of the holiday.

The Chicago Section Board is already planning for next year's activities. A Nominating Committee will be selected this month to seek volunteer members who are willing to serve as elected and appointed officers of the Section for the 1995/1996 time frame. The selection will take place during the next two months and if you are interested in serving, get in contact with any of the Board Members. The activity in the Chicago Section can be extremely rewarding to you, especially if one of your individual motive drives matches the activities of the SAE Section.

What motive drives do we individuals have? How can we match them with the Society's goals? I promise to discuss the topic in my January message. Stay tuned!

Rodica A. Baranescu
Section Chair
You’ll be amazed at the incredible clamping strength of POW’R-GEAR® from Ideal.

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# 1994-95 SAE Chicago Section Board

## Executive Committee

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rodica A. Baranescu</td>
<td>Chair</td>
<td>(708) 865-3717</td>
</tr>
<tr>
<td>Chuck Cornell</td>
<td>Past Chair</td>
<td>(708) 971-2442</td>
</tr>
<tr>
<td>Gary Novak</td>
<td>Vice-Chair</td>
<td>(708) 674-7701</td>
</tr>
<tr>
<td>Margaret Bain</td>
<td>Treasurer</td>
<td>(708) 865-3167</td>
</tr>
<tr>
<td>Dan Kapellen</td>
<td>Secretary</td>
<td>(708) 971-2442</td>
</tr>
<tr>
<td>Eugene Wallace</td>
<td>Co-Chair, Math &amp; Science</td>
<td>(708) 241-0660</td>
</tr>
<tr>
<td>Ray Heller</td>
<td>Co-Chair, Math &amp; Science</td>
<td>(708) 963-9175</td>
</tr>
<tr>
<td>Steve Underwood</td>
<td>Vice-Chair, Membership</td>
<td>(312) 236-8123</td>
</tr>
<tr>
<td>Carson Eddy</td>
<td>Vice-Chair, Student Activity</td>
<td>(312) 227-2410</td>
</tr>
<tr>
<td>Jim Buxton</td>
<td>National Delegate</td>
<td>(708) 865-4339</td>
</tr>
<tr>
<td>Jim King</td>
<td>First Alternate</td>
<td>(708) 887-2012</td>
</tr>
<tr>
<td>Al Kluge</td>
<td>Second Alternate</td>
<td>(708) 859-4974</td>
</tr>
<tr>
<td>Dave Morris</td>
<td>Meetings/Programs</td>
<td>(708) 971-2442</td>
</tr>
<tr>
<td>Michael Block</td>
<td>Engineering Career Resources</td>
<td>(708) 789-0003</td>
</tr>
<tr>
<td>Chuck Cervenka</td>
<td>Magazine Editor</td>
<td>(708) 968-0459</td>
</tr>
<tr>
<td>Linda Gogola</td>
<td>Co-Editor</td>
<td>(708) 859-5774</td>
</tr>
<tr>
<td>Jack Shultz</td>
<td>Advertising</td>
<td>(708) 529-4434</td>
</tr>
<tr>
<td>Mary Jaque</td>
<td>Advertising</td>
<td>(708) 887-2203</td>
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<tr>
<td>Steve Burdette</td>
<td>Chair Company Reps</td>
<td>(708) 887-3736</td>
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<tr>
<td>Bill Warren</td>
<td>Arrangements</td>
<td>(708) 865-3318</td>
</tr>
<tr>
<td>Kelly Bowland</td>
<td>Reception</td>
<td>(708) 858-4867</td>
</tr>
<tr>
<td>Chuck Cornell</td>
<td>Long Range Planning</td>
<td>(708) 971-2442</td>
</tr>
<tr>
<td>Gordon Bailey</td>
<td>Long Range Planning/Photographer</td>
<td>(708) 869-5001</td>
</tr>
<tr>
<td>Al Kluge</td>
<td>Co-Photographer</td>
<td>(708) 859-4974</td>
</tr>
<tr>
<td>Dave Olson</td>
<td>Engineers Week</td>
<td>(708) 858-2800</td>
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## Standing Committee Chairs

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<thead>
<tr>
<th>Name</th>
<th>Position</th>
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<tr>
<td>Adam Wolf</td>
<td>Electronics</td>
<td>(708) 971-2442</td>
</tr>
<tr>
<td>Bob Larsen</td>
<td>Advanced Technology</td>
<td>(708) 252-3735</td>
</tr>
<tr>
<td>Les Asher</td>
<td>Fuels &amp; Lubricants</td>
<td>(708) 420-5944</td>
</tr>
<tr>
<td>Bob Hawken</td>
<td>Agricultural Machinery</td>
<td>(708) 887-2313</td>
</tr>
<tr>
<td>Marty Keane</td>
<td>Construction Equipment</td>
<td>(708) 859-5436</td>
</tr>
<tr>
<td>Yolanda Huslig</td>
<td>Powerplants</td>
<td>(708) 865-4053</td>
</tr>
<tr>
<td>Kelly Bowland</td>
<td>Light Duty Vehicles</td>
<td></td>
</tr>
<tr>
<td>Rich Barthel</td>
<td>Parts &amp; Accessories</td>
<td>(708) 260-7317</td>
</tr>
<tr>
<td>Bill Lindsey</td>
<td>Manufacturing &amp; Materials</td>
<td></td>
</tr>
<tr>
<td>Diane Eaves</td>
<td>Powertrain Development</td>
<td>(708) 789-0003</td>
</tr>
</tbody>
</table>

## Vice Chair, Activities

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dennis Berndt</td>
<td>Past Chair</td>
<td>(219) 873-3516</td>
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<tr>
<td>Gary Patterson</td>
<td>Chair</td>
<td>(219) 879-5451</td>
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<tr>
<td>Al Rioti</td>
<td>Vice Chair</td>
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<tr>
<td>Nick Mawhorr</td>
<td>Secretary</td>
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**Company Profile**

**Amoco Oil company Research and Development**

Amoco Oil R&D efforts focus on developing new and improved products and processes including alternative sources for energy. In our relatively flat organization with just two levels of management between the Engineer/Scientist and the Vice President of research, each individual knows where the company is headed, as well as his or her role in getting there. We encourage mobility among our staff, and many Amoco Oil R&D alumni have advanced to senior management, including the CEO of Amoco Corporation.

The Facilities and Resources of Amoco Oil R&D feature the most-advanced technology. Extensive state-of-the-art laboratory facilities are used for conducting bench, engine, and vehicle tests of Amoco products. Our Innovation Laboratory provides the funds and facilities to test ideas that are not part of the mainstream research program. A high ratio of skilled technicians to engineers/scientists enables researchers to best utilize their planning, technical, and management skills.

Amoco is deeply committed to the environment, as evidenced by the growth of our Environmental Research group. R&D efforts have led to the introduction of the most comprehensive set of environmental alternatives ever offered by one company in a single market:

1) Reduced emissions gasolines.
2) A proprietary vapor recovery nozzle.
3) Used oil collection facilities.
4) Compressed Natural Gas alternative fuel for vehicles.

In a first-of-a-kind project we have joined forces with the EPA to define pollution-prevention opportunities at Amoco Oil’s Yorktown Refinery. On the safety front, AOC R&D passed the three million man-hour mark without one lost workday injury.

YOU EXPECT MORE FROM A LEADER
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For over 60 years, Synchro-Start has been committed to developing quality protection and control systems for the diesel engine industry. With the recent acquisition of DAI Technologies, specialists in state-of-the-art microprocessor based engine and emission control products and engineering services, Synchro-Start has expanded its product line, adding a number of sophisticated new electronic engine management systems for natural gas and diesel engines.

Synchro-Start continues to design, develop and manufacture technologically advanced products. The Translator® is a bi-fuel electronic CNG conversion system designed to work in conjunction with the vehicle's existing computer and diagnostic system. Translator® intercepts signals from the computer and translates them allowing the engine to run on natural gas or gasoline. The PRO-LEAN® system is a dedicated electronic CNG metering and control for medium and heavy duty engines.

Synchro-Start is committed to quality, service and cost effective products. We have been recognized “Supplier Certified” by a dozen industry leaders. At present, we are in the midst of qualifying to meet ISO 9001 standards. Our commitment to qualify enables us to efficiently satisfy our customers' requirements. OEM's call on Synchro-Start to design and develop electro-mechanical linear actuators and electronic protection devices. With our DAI Controls Division we design strategies that are tested and evaluated through computer simulation providing systems that interface the precision of electronic controls with the realities of mechanical systems. Systems have been field proven in transportation, industry and agriculture.

An international leader, Synchro-Start maintains manufacturing, sales, service and warehouse facilities throughout the world. To accommodate the added capabilities generated by Synchro-Start/DAI, a new company, Synchro-Start Products Europe Limited, has been formed to handle the growing European responsibilities.
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KOMATSU DRESSER COMPANY

HEADQUARTERS LOCATION: Tri-State International Office Center, Lincolnshire, IL, a modernistic office complex approximately 20 minutes north of O'Hare Airport.

COMPANY ORIGIN: Established as the second largest supplier of construction and mining equipment in the Western Hemisphere in 1988. Komatsu Dresser Company (KDC) was originally a 50/50 joint venture between Komatsu Ltd., Tokyo, and Dresser Industries, Dallas. Recently, Komatsu Ltd. became the sole owner of the former joint venture.

PRODUCTS PRODUCED: Hydraulic excavators, crawler dozers, crawler loaders, wheel loaders, wheel dozers, off-highway haul trucks, motor graders, compaction rollers, road milling equipment and hydraulic cranes. KDC recently introduced the Komatsu D575A-2, the world's largest bulldozer.

PRODUCT DISTRIBUTION: KDC has more than 200 major distributors in the Western Hemisphere alone. Komatsu and Dresser and Galion products continue to be marketed through their respective distribution networks under their respective trade names.

SALES AND ASSETS: Sales have repeatedly topped $1.3 billion since the formation of the company. Total assets are in excess of $1 billion.

TOTAL EMPLOYEES: More than 5,000

PRODUCTION FACILITIES: A total of four plants utilize more than two million square feet of manufacturing capacity. Plants are located in Chattanooga, TN; Peoria, IL; Galion, OH; Candiac, Quebec.

PARTS: All customer service and materials management functions for all KDC products are managed by KDC's 600,000 square foot Parts Distribution Center near Memphis, TN. An additional parts distribution center is located in Hayward, CA.

FINANCIAL SERVICES: KDC Financial Corporation, headquartered in Downers Grove, IL, is an integral part of KDC that operates with a single-minded dedication to its distribution organization and the construction and mining industry as a whole. The industry-unique financial needs of Komatsu and Dresser distributors and customers are met through competitive rates and an array of flexible financial packages.
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The Chicago Section's first meeting of the 1994-1995 season with Dr. Rodica Baranescu, the Chicago Section Chair.

Main speaker of the evening, Dr. Danilo J. Santini, making presentation on electric vehicles and their effect on the environment.
Section Chair Rodica Baranescu presenting Margaret Bain with SAE plaque which reads, “Achievement in Membership Award.”

Past Section Chair Chuck Cornell receiving a recognition award plaque from present chair, Rodica Baranescu.
September 20 meeting Tech Chairman Adam Wolf thanking representatives of companies who co-sponsored the social period for the evening.

Tech Chair Adam Wolf and Dave Morris representing Snychro-Start Products, Inc. Dave is also Meeting and Program Chairman for the Chicago Section.

Tech Chair Adam Wolf and Steven Cwian, representing Mensura, Inc.
Coffee talk during the September meeting had two students from the SAE Chapter at Uofl Chicago give a talk on their Hybrid Electric Vehicle project.

Walter Gorczowski and Kevin Bishop

The students answering questions after their presentation.
VIRTUAL PROTOTYPEING IN THE AUTOMOTIVE INDUSTRY

by

JAMES D. PRICE

Mechanical design automation software tools have progressed over the past 25 years from 2D drafting to 3D solids modeling, assembly modeling, and even part optimization. Mechanical system simulation (MSS) complements these existing CAD and CAE technologies by enabling engineers to build models of entire systems or subsystems, and then to simulate their full motion behavior and optimize the entire design long before building the first physical prototype—a process called “virtual prototyping.” Today, virtual prototyping software is used by every automotive manufacturer in the world to do everything from designing simple linkages to optimizing windshield wiper systems to perfecting the dynamic ride and handling behavior of new vehicle platforms. Major manufacturers view the technology as a critical element of the product development process, enabling them to experiment with more design alternatives, reduce the number of hardware prototypes, and shorten overall product cycles.

JAMES D. PRICE is the Vice President of Marketing for Mechanical Dynamics, Inc., Ann Arbor, MI, where he has been an officer of the company since 1988. Prior to joining MDI, he spent five years in marketing management positions in the CAE/CAD/CAM industry and another five years as a strategic management consultant. He is a past director of the SAE and serves on numerous civic and academic boards. Mr. Riddle received a B.A. from Oberlin College and an M.A. from Stanford University.

COFFEE BREAK

SILICON GRAPHIC & ROSS

ROSS RIDDLE

Silicon Graphics, Inc., is a leading manufacturer in the computer market for producing workstation graphic capabilities as well as applications times. Ross Riddle will introduce the latest SGI workstation and SGI media tools.

Mr. Riddle has been with Silicon Graphics for five years. He received a B.Eng. degree from Queen Mary College, University of London, and a D.Eng. from the University of East Anglia in Norwich, England.

MEETING
Detroit Section and serves advisory boards, including the Technology Council. He holds a B.S. in Engineering (Ohio) and an M.B.A. (California).

Silicon Graphics for seven years, in Computer Science from University of London.

Kelly D. Bowland is an Applications Engineer for Mechanical Dynamics, Inc. She graduated from Virginia Tech in Blacksburg, VA, with a B.S. in Mechanical Engineering.

5:30 P.M. Social Period
6:00 P.M. Dinner
7:00 P.M. MEETING

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Dinner Reservations Required
Single Table Reservations
Restricted to 8 People
Requests for Special Dietary Meals Must be Made at the Time of Reservations

Please make reservations by Friday, December 9, 1994

For Reservations and Information contact Section Office
(708)663-0010
COMMENTS ON A SUCCESSFUL OCTOBER MEETING

On October 11, SAE President Elect John Leinonen visited the Chicago Section with John Casker from the SAE International home office in Warrendale, PA. Both men got an early flight and were at O'Hare Airport before 10:00 a.m. After checking in at the Oak Brook Hyatt Regency, they motored to Itasca Country Club for a late luncheon with local company executives. Mr. Leinonen's talk covered his long involvement in SAE and what the Section can do to increase membership and how the executives can help. The day continued by driving to Marie's Ashton Place in Willowbrook for the Section Governing Board meeting and then the dinner meeting.

Mr. Leinonen was the main speaker for the evening. His subject was “Automotive Safety in the 1990's.” The talk covered safety issues and technology to be applied in the remainder of the decade. The number of questions after the presentation indicated how much interest there was in the subject. The day for the two ended about 10:00 p.m. at the hotel.

The Coffee Talk was presented by three students from the Uofl Chicago about their Mini-Baja projects. They covered their experiences in the design, fundraising, fabrication, and competition of their two Mini-Baja vehicles. Their description of the problems with the vehicles during the competition was hilarious. The audience roared when they described parts that failed or fell off during the race.
President Elect John Leinonen's visit in October at the evening dinner meeting at Ashton Place.

Facing from the left, three UofLC students; John Leinonen; John Casker from SAE International in Warrendale, PA.

John Leinonen giving his presentation.

The evening's Tech Chairman, Bob Hawken, presenting John Leinonen with a small token of appreciation for his talk.
Chicago Section Chair Rodica Baranescu addressing the luncheon group of local company executives and Chicago Section members before introducing John Leinonen.

John Leinonen with Nancy O’Brien, teacher from Caroline Bentley School, New Lenox, IL.

John Leinonen addressing the luncheon.
October Dinner Meeting Social Period Sponsors. The generosity of these companies helps the Section in financing its dinner meeting. The following pictures are photos of five representatives of seven companies that sponsored our social period.
FUND YOUR CHILD’S COLLEGE TUITION WITH ZERO COUPON BONDS
Mary Kay Kluge
Associate Vice President, Investments
Dean Witter, Naperville, IL

For many new parents and grandparents, finding a way to fund their children’s and grandchildren’s future education expenses is a primary concern. College costs have risen at an average annual rate of 8% over the past ten years, and today’s parents can count on a hefty bill for their children’s education in the future. In fact, at this rate, it could cost as much as $80,000 for a four-year public college education 17 years from now! How can parents and grandparents help meet these future education costs? One way to generate funds for college expenses is to invest in a ladder portfolio of U.S. Treasury strips zero coupon bonds. Here’s why.

SAFETY AND CERTAINTY OF RETURNS
U.S. Treasury strips, commonly known as Fed strips, are backed by the “Full Faith and Credit” of the U.S. Government—the highest level of credit quality available in a fixed income investment. In addition to safety, Fed strips also provide the buy-and-hold investor with a guaranteed rate of return. As with most zero coupon bonds, Fed strips are offered at a discount to their face value and pay no periodic interest over the life of the security. Instead, interest accumulates at the stated yield level, compounding toward full maturity value and eliminating reinvestment uncertainties. When Fed strips are held to maturity, the difference between the discounted purchase price and their face value represents the return on investment.

AFFORDABLE AND FLEXIBLE
Depending on the maturity of Fed strips, the discounted purchase price can make this security very affordable. A Fed strip maturing in 18 years can currently be purchased for a fraction of its $1,000 face value. What’s more, Fed strips are issued with February, May, August and November maturities of every year, extending out to 2021. This flexibility is appreciated by those investors looking to time the maturity of their bonds to coincide with their individual financial objectives. More important, the flexibility of this security makes it a good selection for ladder portfolios.

FED STRIPS ARE IDEAL FOR LADDER PORTFOLIOS
Building a ladder portfolio of Fed strips is as easy as spreading the total dollar amount of your investment among a series of successive maturities. College planning investors can conveniently purchase a Fed strips ladder with bonds scheduled to mature in August of each school year in the future when tuition payments are typically due. This method of investment
provides an affordable, simple way to plan ahead.

**SAMPLE COLLEGE PLANNING LADDER**

<table>
<thead>
<tr>
<th>SCHOOL YEAR</th>
<th>ISSUE</th>
<th>MATURITY</th>
<th>VALUE AT MATURITY</th>
<th>COST TODAY</th>
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<tr>
<td>2011-2012</td>
<td>YEAR 1</td>
<td>FED STRIPS</td>
<td>08/15/11</td>
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<td>2012-2013</td>
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<td>FED STRIPS</td>
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<td>2014-2015</td>
<td>YEAR 4</td>
<td>FED STRIPS</td>
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<td>$20,000</td>
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<td>TOTALS:</td>
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<td></td>
<td></td>
<td>$80,000</td>
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Assuming annual public college costs in seventeen years of $20,000, a four-year $80,000 college bill would cost only $19,255 if you invested toward these costs today through this hypothetical Fed strips ladder portfolio. NOTE: figures in this example are for illustrative purposes only and may not reflect current rates.

**CONSIDER GIFTING A LADDER OF ZERO COUPONS TO A CHILD**

A convenient way to enhance the returns of zeros earmarked for college funding is to establish a ladder portfolio within a special custodial account that, depending on your state of residence, satisfies the requirements of either the Uniform Gifts to Minors Act (UGMA) or the Uniform Transfers to Minor Act (UTMA).

When funds are deposited in an UGMA or UTMA account, they constitute an irrevocable gift to your child. Under current law, a single parent may annually gift up to $10,000 per child ($20,000 annually for a married couple) without gift tax consequences.

Income earned by a minor generally carries certain tax advantages, including the exclusion of Federal taxes on the first $600 of unearned income. The second $600 is taxed at the child's rate. Earnings by a child in excess of $1,200 are taxed at the parents' rate until the child is 14 years old, after which all such income is taxed at the child's rate. Investors should consult their tax advisors about current UGMA and UTMA gifting requirements and discuss their tax situation before making any tax-related investment decisions.
Lub-Tek Engineered Lubricants, a division of Lub-Tek Petroleum Products Corporation, manufactures quality lubricants sold to the high performance and consumer market.

William Nehart, president, blended his first oils in 1975. Since then, the need existed for lubricants to provide exceptional performance in the areas of wear reduction, fuel economy and shear stability. Lub-Tek has added more products and gained more experience. Year after year.

Today, Lub-Tek has found that their involvement in motorsports has helped in the development of 100% shear stable lubricants. Development on the track and in the laboratory have produced engine oils that provide increased power, increased torque, increased durability and decreased fuel consumption.

The parent company, Lub-Tek Petroleum Products Corp., is involved in the manufacture of specialty products for many other independent and major oil companies. The main focus in the specialty areas are viscosity index improvers. Viscosity index improvers are utilized in the formulation of multigrade engine oils and lubricants. Other accomplishments have included the development of a new shock and strut fluid to be used in the next-generation computer controlled systems.

Customer commitment is number one, and we respond to your needs right away. And more important, when you work with our products and realize the benefits, you know you’re getting the best.

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