Information Guide for

PARENTS

Of Prospective Students in the

Mechanical Engineering Department
Kate Gleason College of Engineering
Rochester Institute of Technology

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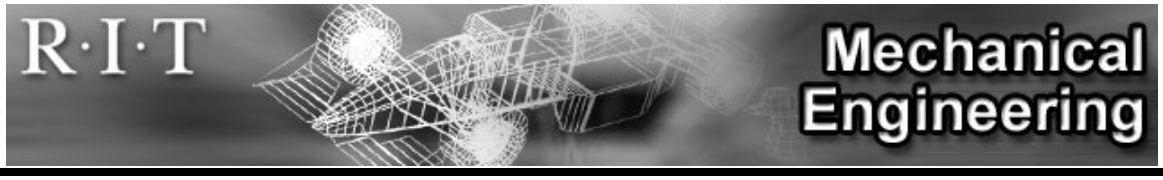

R·I·T

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Dear Parent,

Thank you for working with your son or daughter as they go through the process of selecting a university and a program of study. I realize that the process is time consuming, can be frustrating at times, and is also full of opportunity, and trepidation. I hope that this information guide will help to answer the questions that you may have, and facilitate discussion about career choices and college selection with your child. Your child – a young man or woman – is trying to make one of the most important decisions that they have been faced with up to this point.

Rochester Institute of Technology offers a unique educational experience, one that we feel is of high quality, and embraces certain core philosophies. Only your son or daughter can decide if these core philosophies are in line with their own goals and aspirations. Here in mechanical engineering, we believe that individuals learn to become engineers by practicing engineering – not just by talking about it.

As a result, the first cornerstone of our educational program is our mandatory co-operative education program. Through this program, students completing the five year Bachelor of Science degree in mechanical engineering will complete a full four years of academic study, complemented by one equivalent year of full-time practical experience.

The second cornerstone of our educational program is our focus on career-oriented education. Our program seeks to lead higher education in preparing our mechanical engineering students for successful careers in a global society. We believe that our graduates must possess technical strength in their chosen discipline, and be able to work with individuals from other disciplines in an effective manner.

The educational objectives of our Bachelor of Science degree program in Mechanical Engineering program at Rochester Institute of Technology are to prepare ***all*** of our graduates to:

1. Apply fundamental knowledge, skills, and tools of mechanical engineering,
2. Practice mechanical engineering in support of the design of engineered systems,
3. Accept the professional and ethical responsibilities to function as an engineer,
4. Contribute and communicate effectively within and across teams,
5. Continue their development as lifelong learners,
6. Possess a broad education and knowledge of contemporary issues,

and, to prepare ***some*** of our graduates to

7. Work as engineers in aerospace and automotive industries,

8. Enter graduate programs and succeed in obtaining graduate degrees at the Master's and/or Ph.D. level.

The ME Department achieves these objectives by:

- Integrating cooperative education into the program for all students,
- Providing a strong foundation in mathematics and science with a balance between liberal studies and technical courses,
- Establishing balance between the engineering science, an appropriate computational experience, experimental work, and engineering design components of the program,
- Incorporating a strong laboratory component in the program with outstanding laboratory facilities,
- Having a diverse faculty committed to engineering education,
- Providing program options for students to customize their program of study,
- Making available a combined BS and Masters options to academically stronger students. This option allows a student to complete the requirements of both a BS degree and Master of Science or a Master of Engineering degree in a five-year period.

We seek to engage and motivate our students through stimulating and collaborative experiences. Our mission is to provide technology-based educational programs for personal and professional development. We rigorously pursue new and emerging career areas. As one example of this process of continuous improvement, we are getting ready to launch a new "Bioengineering Option" to complement our existing "Aerospace Engineering Option" and our "Automotive Engineering Option." We are also reinventing one of our dormant program options to form a new "Energy and the Environment Option." We have lots to share with you, and I welcome you to read this guidebook to learn more about our academic programs, co-curricular offerings, and campus life at RIT.

We hope that this guidebook will provide you with information the information that you need as you guide your son or daughter through their decision process. Thank you for considering RIT, and best wishes on your college search!

Sincerely,

Dr. Edward Hensel, P.E.

Edward C. Hensel
Professor and Department Head

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The Kate Gleason College of Engineering

RIT's Kate Gleason College of Engineering provides a nurturing educational environment within which to earn a highly marketable degree that serves students well, whether they choose to pursue a career in industry or attend graduate school in engineering or a related field. The college offers undergraduate and graduate programs in a full spectrum of engineering disciplines. The Kate Gleason College of Engineering at RIT is the nation's premier career-oriented college of engineering.

Facts & Figures about the KGCOE

Fall 2003 Enrollment	**Degree Levels Offered**
1,992 Undergraduate Students	Associate (AS)
367 Graduate Students	Bachelor of Science (BS)
	Master of Science (MS)
	Master of Engineering (MEng)
	Advanced Certificate
	Doctor of Philosophy (Ph.D.)

Rankings

Recently ranked 6th in the nation among engineering colleges that offer the master's degree, the Kate Gleason College of Engineering is totally committed to student success and strives to provide students with a career-oriented education of the highest possible quality and the capabilities for lifelong learning. The college recently added the nation's first Ph.D. program in microsystems engineering.

- 6th in the nation among engineering schools that do not grant the Ph.D. degree (2002 U.S. News & World Report)
- 6th in the nation among universities that offer experiential learning (co-op and internship) programs (2003 U.S. News & World Report)
- 77th in the nation* among engineering schools that offer the Ph.D. degree (2003 U.S. News & World Report)

*New classification due to the launch of our inter-disciplinary Ph.D. program in Microsystems Engineering

About Kate Gleason

Born on November 25, 1865, Kate Gleason was the daughter of a machine-tool factory owner. By the age of twelve, Kate began working in her father's factory. Kate studied mechanical arts at Cornell University, at Sibley College of Engraving, and at Mechanics Institute, now known as the Rochester Institute of Technology. Shortly thereafter, Kate joined her father at Gleason Works, helping to promote her father's business, which became one of the leading sellers of machine tools in the United States. During World War I, Kate Gleason became the first woman president of a national bank and was also named the first woman member of the American Society of Mechanical Engineers. Following her tenure at the bank, Kate concentrated her efforts on developing low cost housing in various locations

across the nation. Kate Gleason died on January 9, 1933. Our College is the only College of Engineering in the USA named after a woman.

The Kate Gleason College of Engineering offers programs to prepare students for present-day industrial and community life, and to lay a foundation for graduate work in specialized fields. This is accomplished by offering curricula which are strong in fundamentals and maintain a balance among the liberal arts, the physical sciences and professional courses.

The College offers five, five-year cooperative education programs leading to the bachelor of science degree with majors in computer, electrical, industrial, mechanical and microelectronic engineering. Graduate programs leading to a Master of Science and/or a Master of Engineering degree are offered in all five departments. A Master of Science degree in Applied and Mathematical Statistics is also offered through the Center for Quality and Applied Statistics and a Master of Science in Materials Science and Engineering is offered jointly with the College of Science.

The departments maintain extensive laboratory facilities to provide students with ample opportunity to work with state-of-the-art equipment in their respective fields. The laboratories are equipped to provide meaningful practical experience, offer students the opportunity for independent projects and provide facilities for applied and fundamental research by students and faculty.

RIT's time-honored and distinctive approach to undergraduate education has not changed. We continue to focus on four major principles that underlie and distinguish engineering education at RIT. They are:

- Excellent teaching
- Learning by doing
- Working as a team
- Exploring real-life, industry-inspired problems

These principles drive everything that we do in our classrooms and laboratories. Our cooperative education program (co-op) remains among the leading programs in the world, and our emphasis on this will not waiver. Our faculty's top priority is teaching. They complement their teaching with research and ongoing contact with the world of work.

The Dean of the College is Dr. Harvey Palmer. He obtained his Ph.D. at the University of Washington and was long associated with the University of Rochester before joining RIT in the summer of 2000.

The Department of Mechanical Engineering

Mechanical Engineering is a broad discipline, covering such diverse topics as aerodynamics, automotive technologies, energy systems, biotechnology, control systems, materials development, structural integrity, and robotics. The Mechanical Engineering Department at RIT offers a solid foundation in ME fundamentals as well as the opportunity for students to concentrate their studies in one of several specific areas of engineering. In ME classes, students will be exposed to a balance of theory, hands-on experiment and design. Our laboratory facilities are primarily intended for student use, although most professors also participate in ongoing research projects in these same labs. Undergraduate students can become involved with these projects through class, co-op experience, or through participation in dual degree programs which allows students to earn both Bachelors and Masters degrees in a five-year period. Graduate study can be concentrated in solid body mechanics, thermal fluid sciences, dynamic systems and controls, or project management in a product development environment. With a faculty that include several recipients of teaching awards, RIT has demonstrated commitment to excellence in education.

In order to help our graduates achieve the objectives of our academic program (the objectives are what we prepare our students to accomplish in the first several years of the professional career), we have adopted a number of educational outcomes. Every graduate is expected to demonstrate competency in each outcome by the time that they complete their B.S. degree. The outcomes of our career-oriented Bachelor of Science degree program in Mechanical Engineering at Rochester Institute of Technology are such that all graduates of the program will be able to

1. Engage in the mechanical engineering profession.
2. Design a system or a component to meet a set of customer specifications and constraints, as well as to define and write the requirements of the design.
3. Identify, formulate, and solve mechanical engineering problems.
4. Use the techniques, skills, and modern engineering tools necessary for engineering practice.
5. Understand the impact of engineering solutions in a global and societal context.
6. Know how to apply mathematics, science, and engineering principles to mechanical engineering.
7. Design and conduct experiments, as well as analyze and interpret data.
8. Participate in multi-disciplinary teams.
9. Understand professional and ethical responsibility.
10. Communicate effectively by written, verbal, and graphical means.
11. Engage in life-long learning and recognize its importance.
12. Understand contemporary issues.

Facts & Figures about the Mechanical Engineering Department

AY 2003-04 Statistics
615 Undergraduate Students
115 Graduate and Dual Degree Students
130 Entering first year students (direct to ME)

M.E. Degrees and Options Offered
Bachelor of Science (BS)
Master of Science (MS)
Master of Engineering (MEng)
Advanced Certificate (Vibrations Engineering)
Aerospace Engineering Option
Automotive Engineering Option
Bioengineering Option (Coming Soon)
Energy and the Environment Option (In Development)

The Mechanical Engineering Department offers programs at the undergraduate and graduate level. The undergraduate program is a five year (including five quarters of co-op) accredited program leading to a BS degree. Options are available in Bioengineering, Aerospace Engineering, Automotive Engineering, Energy and the Environment, , and a combined program leading to both the BS and MS degrees simultaneously. At the graduate level, the department offers an MS degree in Mechanical Engineering or a Masters of Engineering degree in Mechanical Engineering, or a Masters of Engineering degree in Manufacturing Engineering (offered jointly with the ISE Department). An MS degree in Materials Science is also offered jointly with the College of Science.

Bachelor of Science in Mechanical Engineering

The B.S degree in mechanical engineering at RIT is offered predominantly as a day-time residential program, with required co-op experiences integrated throughout the curriculum. Our campus operates on the quarter system, with four quarters per academic year. Our BS program is designed to take five years to complete, during which students will complete 12 academic quarters on campus, and one year full-time equivalent (typically spanning five academic quarters) work experience of co-op education. Students usually complete their first two years of study on a traditional academic year, beginning in September with the fall quarter, and ending in May with the spring quarter. Following conclusion of two years of study, students will begin to alternate between quarters on campus, and quarters on co-op. The co-op schedule is somewhat flexible, so that students may alternate on single blocks between campus and co-op, or double blocks. In rare cases we allow a triple block with companies that have demonstrated a well structured co-op experience. After the conclusion of the second academic year, most of our students are either in classes, or working at co-op jobs all year-long.

RIT Mechanical Engineering also offers students an opportunity to pursue two degrees at one time. Students that are accepted to this highly competitive dual degree program may pursue a BS in Mechanical Engineering concurrently with an M.S. in Mechanical Engineering, or they may pursue a BS in Mechanical Engineering concurrently with an M.E. in Mechanical Engineering. Students in the dual degree program complete four, rather than five co-op experiences, and typically spend 14 academic quarters on campus, rather than 12. Many students will stay past spring of their fifth year to finish their thesis and defense.

A limited number of students may pursue study toward the BS degree on a part-time basis, and a number of evening sections of classes, particularly lower division courses, are offered to support this mode of study. Most students generally complete their study as full-time students, although we have a small number of students that complete the BS degree program on a part-time basis.

We accept transfer students from other institutions into the RIT mechanical engineering department, and rely upon college-level articulation agreements with those programs from which we receive the most students. We have arrangements with Roberts Wesleyan University, Monroe Community College, Finger Lakes Community College, Jefferson Community College, and Alfred Tech.

At RIT, we have decided to pursue the goal of becoming a role model for engineering schools in the USA with respect to multi-disciplinary design. We have implemented a multi-disciplinary capstone design sequence that provides every student in mechanical engineering with an experience working as a member of a multi-disciplinary design project team at the capstone level. Our model is being embraced throughout the college of engineering, is gaining exposure at the institution level, and has been presented at several national conferences in educational and discipline specific conferences. We believe that our multi-disciplinary design course sequence is among the most comprehensive in the nation, and is continuing to grow in size, quality, and recognition. Since AY2002-03, every student in mechanical, electrical, and industrial engineering has participated in the course. Additional students from computer engineering, micro-electronic engineering, engineering technology, and industrial design have participated on a less formal and individual basis. We have obtained two significant pledges of financial support, which will be used to design and build dedicated space for this capstone design sequence. Over 30 faculty members from the College of Engineering are actively engaged every year in our capstone design program. We complete nearly 40 design project annually, with sponsors including faculty research programs, corporate and foundation gifts, government agencies, and even student sponsors. Collectively our students expend more than 25 engineer-years of effort each academic year, on about 35 projects with a total budget exceeding $100,000. Each team typically consists of 6-8 students, a trained student manager, a faculty mentor, faculty coordinator, and a sponsor contact. We are also leading the way with multi-disciplinary design projects at the lower year levels. The KGCOE pilot program in multi-disciplinary design for honors students at year levels 1, 2, and 3 contains many elements that would often be found in capstone design projects at other universities. We are using this learning experience with a group of talented lower-division students to better understand how to teach formal methods of engineering design at lower year levels.

Undergraduate Student Admissions

Undergraduate students may enter the RIT Mechanical Engineering Program in several ways. These include:

1. Direct admission to the RIT Mechanical Engineering program as a first year student. The majority of our students enter the program in this manner. We admit about 130 students as first-year students annually.

2. Admission to the RIT Undeclared Engineering, and Change of Program (COP) into the M.E. department at any time during the first year of study. A significant number of students enter the program in this manner. We typically admit about 60 students from undeclared engineering annually.
3. Admission to another program on the campus of RIT, and Change of Program (COP) into the M.E. department. Students wishing to enter the program through this process are evaluated competitively, and on a space-available basis. Students will be required to achieve certain GPA requirements in specified courses to be considered for a change of program into the M.E. department. Students may COP into mechanical engineering from another engineering discipline during the first year of study with very little, if any, "time penalty" towards completion of degree. Students who change programs after the first year of study may require additional time to graduate.
4. Transfer admission into the M.E. program from another campus. Students wishing to enter the program through this process are evaluated competitively, and on a space-available basis. Students transferring from another institution usually enter at the third-year level.

Undergraduate students are evaluated for admission by the RIT admissions office. Prospective students are assessed using a variety of metrics, including standardized test scores, high school performance, extracurricular activities, reference letters, and sometimes personal interviews. Questions about freshman admission should be directed to the RIT admissions office. For the past several years, there has been overwhelming interest in entry to the mechanical engineering department, and we have far more applicants to our program than we can accommodate. As a result, all first year admissions to the ME department, *and pre-matriculated changes of program into the ME department from another program*, are managed by the RIT admissions office. Prospective students requesting to do so have an opportunity to tour the residential area of the campus and the academic areas of the campus through admissions office programs. Prospective students also regularly visit the department with their parents, as part of their day on campus, and have an opportunity to meet with a faculty member in the mechanical engineering department.

Undergraduate Student Advising, and Mentoring

All undergraduate students in the Mechanical Engineering program are assigned to an academic advisor. Direct admit mechanical engineering first year students are assigned to a freshman seminar cohort during June prior to their arrival. The department head and administrative staff of the ME office construct a Fall schedule of classes for all incoming first year students. To the greatest extent possible, we try to block schedule our incoming students with their freshman seminar cohort. We use indicators such as the RIT math placement examination, their admissions profile, expressed preferences for an option (such as Aero or Auto), and assessment of AP credit to both construct a schedule of classes, and place the students in a peer group that will give them a higher opportunity for success. Our students receive letters from the ME department head during the summer, and also get communications from our office staff about their schedules, AP credits, etc.

Students are welcomed to campus one week prior to the beginning of the Fall quarter, as part of the "RIT Week of Welcome." The week consists of many events for students and

parents, and represents an opportunity for the students to get familiar with the campus before getting busy with school work. During the week of welcome, the RIT Kate Gleason College of Engineering hosts Engineering Day – a fun event that introduces the each freshman seminar group to their faculty advisor, and typically another faculty helper. Thus, the intent is for every first year ME student to meet their faculty advisor in a social setting before classes even begin. All direct admit ME students are enrolled in mechanical engineering classes, such as freshman seminar, during all three quarters of their freshman year. We typically offer five sections of freshman seminar during the fall quarter, focused on direct admit ME students, and an incremental two sections during the winter quarter, composed predominantly of students entering the ME program from the undecided engineering program. Students coming into ME from the undeclared engineering program are assigned a primary faculty advisor in the ME Department, and continue to maintain a secondary advisor from the KGCOE Office of Student Services, who worked with them during the placement process.

During the freshman seminar class, students work with a cohort of other advisees sharing a common faculty advisor on a project that is intended to be both educational and fun. Also during the freshman seminar class, the students have an opportunity to meet with their advisor for winter and spring course selection, and the departmental office staff visits every freshman seminar sections about week five, as students are preparing to register for their classes. Each quarter during the first year, a "Dean's Hold" is placed on every first year student's Student Information System (SIS) account, that prevents them for registering for classes. We require every first year student to meet with their faculty advisor every quarter prior to being allowed to register for classes. The faculty advisor informs the ME office staff when each meeting has been completed with their advisees, and then the "Dean's Hold" is removed, so that students can register. The intent of this process is to get students in the habit of conferring with their faculty advisor on a regular basis, particularly as related to academic advising, course selection, and career planning. This process was implemented during the AY2002-03, and anecdotal information indicates that the process is being successful at establishing better lines of communication between the student and the faculty advisor at an early date.

Advising in the ME program is greatly enhanced by our office staff. In particular, Diane Selleck of our office regularly earns accolades from students for her efforts in helping with everything from class registration and writing exams to co-op reports and planning for the future. The KGCOE regularly conducts advising surveys of our students, and we use the results to identify strengths and weaknesses in our advising system. As a result of feedback obtained from the formal student advising surveys, from the ME student advisory committee (ME-SAC), and from informal feedback by individual students, we have made several enhancements to our departmental advising processes. Recently, for example, we have changed the advisor rotation, improved the co-op student report, and created specific degree audit templates for every degree program and option within the department.

Our goal is for students to continue working with the same advisor that they initially were assigned to upon entry to our program, until they graduate. Naturally, some students get to know a faculty member later in their academic career, and may request change to another advisor. We accommodate those requests. In addition, when undergraduate students admitted

to the dual degree program (BS/MS) identify a thesis topic, their advisor is changed at that time.

Students entering the program as a change of program (other than from undeclared engineering) typically come into the ME program after the freshman seminar sequence is complete. In that case, the Associate Department Head meets with the individual student, and they are assigned to an advisor in the ME department. We assign these students based on their academic year level, and open advising slots available to the faculty member.

RIT operates an "Early Alert" system in classes all across campus. With this system, a faculty member in any class can communicate with a student they view at risk. The instructor may easily copy the student's primary and secondary advisor, FYE coach, home department head, and other support services as needed. We are still experimenting with this early alert system to determine the way to make it the most efficient and effective. At this time, the instructor of each class is expected to notify students that they are at risk and recommend remedial actions to improve things. When advisors see a pattern of early alerts (*e.g.* both math and science are getting bad grades at mid-term), or a recurring theme of a particular problem (*e.g.* the student misses many classes), they are encouraged to invite the student for a frank and open discussion of the issues. If students are non-responsive to faculty requests for a meeting, then the department has the option of placing a "Dean's Hold" on the student account to verify that the proper follow up is being taken.

Every quarter, the academic progress of our students is assessed. At the conclusion of grade reports each quarter, we prepare a list of probations and suspensions. In addition, we review several times each quarter the list of students receiving a grade of D, F, or W in courses. We use all of these as indicators of at-risk performance. We have observed a strong negative correlation between first year students earning at least one D, F, or W and their subsequent likelihood of completing a degree in their original discipline. Thus, we are now focusing a great deal of effort on identifying these at-risk students and trying to mitigate problems before they make it to the position of probation or suspension.

Students on academic suspension may be required to leave campus for one academic year. When students are informed of suspension, they are invited to apply for a waiver of suspension through the ME Department. During the appeal meeting, we usually arrive at one of several outcomes: (1) the suspension is upheld – usually the case for a second occurrence, (2) the suspension is waived – and a series of proactive measures are implemented in concert with the faculty advisor, (3) the student is referred to the College Restoration Program – the preferred response that allows students to build study skills and perhaps take one engineering class, (4) the student is referred to the Career Exploration Program – preferred when we suspect that students may not really be suited for or interested in an engineering and technology career, or (5) the students is out-placed to another academic program, often on a probationary basis. Most of the students leaving the ME program go into the Mechanical Engineering Technology program, although Civil Engineering Technology, Packaging Science, and Industrial Design are also fairly common selections. Students on waiver of academic suspension are not normally allowed to make forward progress on their engineering and technical courses – rather they are required to spend at least one quarter re-building their

foundation, and bringing their GPA back up to appropriate levels. The department often requires the student to agree to bi-weekly update meetings with their faculty advisors until the time that their GPA is back in good standing. This has proven to be an excellent tool to track students recovering from suspension, and has resulted either in solid recovery for the student, or confirmed that out-placement is the correct option. When students are enrolled in other programs, such as ROTC, NTID, or LDC, support personnel from those programs are consulted, and included in the discussions.

Class withdrawals are handled very effectively in the ME program. Prior to the sixth week of the academic quarter (but after the first week add/drop period), students wishing to withdraw from a class meet with their faculty advisor. The advisor is expected to discuss the implication of the course withdrawal with the student, indicate the impact this may have on the student's program of study, and then refer the student to the departmental office. The student then meets briefly with an Associate Department Head to review the student's request, re-cap the advisor's recommendation, and then execute the course withdrawal. Prior to the sixth week, we rarely, if ever, decline the student's request for withdrawal, but we try to insure that students are fully informed. This process, used for several years in mechanical engineering, has proven so effective that it is now being implemented on a college-wide basis, and may even be adopted throughout RIT. After the sixth week of the academic quarter, students must typically provide an exceptional reason for late withdrawal from a class. The Department Head confers with the Associate Dean to determine if the request should be honored. Late withdrawals are commonly approved for reasons of illness, family tragedy, or other circumstances beyond the student's control.

Mechanical Engineering Undergraduate Program Options

At the undergraduate level, we offer the Bachelor of Science in Mechanical Engineering with a number of study options. Students may complete their BS degree with a wide degree of flexibility, or may elect to complete one of these options to prepare them for a particular career focus:

Bioengineering Option

This option is currently under development, and will consist of a series of electives that provides students with exposure to a wide range of bioengineering opportunities. The option has been approved by the departmental curriculum committee, and will be in processing through the college and institute curriculum committees during the 2004-05 academic year. We hope to have the option fully approved by the conclusion of the year. The option will consist of one or more biological science electives, a free elective on Contemporary Issues in Bioengineering, and three technical electives chosen from a wide variety of offerings such as Aerosol Mechanics in Biological Systems, Biomechanics, Biomaterials, Artificial Organs, biosensors, and biotransport phenomena. Students choosing this option are expected to work on a bioengineering design project in the Senior Design I and II capstone design courses taken by all mechanical engineering students in the fifth year of study, and to pursue co-op employment in a related field. Students planning to study in this option should insure that they select science elective courses in the biological sciences

during their first and second year. A decision to enroll in the bioengineering option needs to be made prior to the start of your fourth year, and you may contact Professor Nye for additional information. We anticipate that many students in this option will elect to participate in our Human Powered Vehicle (Moonbuggy) competition team in the department.

Energy and the Environment Option

This option is currently under review, and is being revived during the 2004-05 academic year in response to strong student interest. This option will consist of a series of electives that provides students with exposure to a wide range of opportunities and careers associated with energy intensive systems, and how they relate to the environment. Students in this option will complete a free elective on Contemporary Issues in Energy and the Environment, and select three technical electives chosen from a wide variety of offerings such as Advanced Thermodynamics, Direct Energy Conversion, Fuel Cell Technology, Heating Refrigeration and Air Conditioning, and Internal Combustion Engines. Students choosing this option are expected to work on an energy systems design project in the Senior Design I and II capstone design courses taken by all mechanical engineering students in the fifth year of study, and to pursue co-op employment in a related field. A decision to enroll in the Energy and The Environment option needs to be made prior to the start of your fourth year, and you may contact Professor Nye for additional information.

Aerospace Engineering Option

This option allows for specialized study in the upper-level undergraduate curriculum focusing on engineering aspects of air- and space-borne vehicles. Building on the fundamental courses completed by all mechanical engineering students, a balanced exposure to the aerospace area is gained through a sequence of five specialized courses in four broad areas: aerodynamics, aerospace structures, propulsion, and flight dynamics. In addition, students choosing this option are expected to work on an aerospace engineering design project in the Senior Design I and II capstone design courses taken by all mechanical engineering students in the fifth year of study, and to pursue co-op employment in a related field. A decision to enroll in the aerospace option needs to be made prior to the start of your fourth year, and you may contact Professor Nye for additional information. Many students enrolled in this option elect to participate in the aero design club within the department.

Automotive Engineering Option

This option is intended to increase the opportunities for students who want to work for the automotive industry both in co-op and upon graduation. It offers a series of specialized courses that provide an introduction to vehicle power plants, dynamics, and control systems. The sequence starts in the fourth year with an introductory course acquainting the student with the general field of automotive design and manufacturing. This is followed in subsequent quarters by technical electives in vehicle dynamics, internal combustion engines and automotive control applications. In addition all students choosing this concentration are expected to work on an approved automotive senior design project in

the Senior Design I and II capstone design sequence taken in the fifth year of the program, and to pursue co-op employment in a related field. A decision to enroll in the aerospace option needs to be made prior to the start of your fourth year, and you may contact Professor Nye for additional information. Many students enrolled in this option elect to participate in the autosports competition team (Formula SAE) in the department.

Dual Degree Program Options

Students whom perform particularly well in their academic studies may be invited to participate in a *Dual Degree Program*, which will enable them to earn both a Bachelor's and a Master's degree in approximately five years. Students enrolled in the dual degree program are required to successfully complete a minimum of 230 quarter credit hours and must complete four co-op work blocks. Students can be nominated, or apply, for admission to the dual degree program during the winter quarter of their second year. Students in this program begin their co-op experience in the summer at the end of the second year. Admission into the highly competitive dual degree program is based on the student's cumulative grade point average, three letters of recommendation from the faculty, and a personal interview. Most students admitted into the program are in the top 10% of their class. All students in this program are required to maintain a grade point average of at least 3.2. Additional details about the application process are provided to students during the winter quarter of the second year of study. More information about the dual degree programs may be found in the "graduate studies" section of this guidebook.

The Cooperative Education Program in Mechanical Engineering

The College of Engineering at RIT is firmly committed to a quality cooperative education program. The faculty and administration believe wholeheartedly in the value of cooperative work experience as it forms part of the undergraduate education at RIT. Cooperative education [co-op] gives you the opportunity to apply in the workplace what you learn in the classroom, and bring to the classroom what you learn in the workplace.

The cooperative education portion of the Engineering program starts following the student's second year of the five-year program leading to the Bachelor of Science degree. Students must have the approval of their academic department indicating that they are eligible to participate. Students attend classes during the fall, winter and spring quarters of their first and second year. Following the completion of the second year, students will alternate periods of study on campus with periods of co-op employment. The philosophy of the co-op program is to integrate on-the-job work experience with in-the-classroom academic experience to achieve a more well-rounded education.

Our co-op coordinator, Carolina Cizmar, is assigned to assist mechanical engineering students with placement efforts. This process begins with an orientation session in which students learn about resume building, contacting employers through the co-op office, and numerous details about scheduling, registration, and reporting. It is through your efforts, in cooperation with the Cooperative Education and Career Services Office, that you will obtain your co-op positions. Although academic credit is not given for cooperative work

experience, satisfactory performance during cooperative work periods is considered a requirement for the degree and cooperative work reports are to be submitted to the department. Each student is required to complete five quarters of co-op.

It takes hard work and effort on behalf of the students to locate employers who participate in co-op programs, and meet the student's specific needs in regard to career development and professional objectives. A successful program requires the cooperation of all parties involved. Students are encouraged to consider co-op placements in a variety of locations and corporate settings, so that they get a range of exposure to professional opportunities.

We find that our students mature in a different way as part of the co-op experience. For many students, this may be the first time they have traveled on their own, participated in professional job interviews, and made arrangements for housing independent of their parents. Sometimes, students face significant challenges in finding the right co-op position. They often get nervous about the amount of time and effort that it takes, are concerned about how well interviews go, and how to write thank-you letter. In short, we observe that students may face challenges that are not only technical and job-related, but also "learn about living" through their co-op experiences. We also find that students ask a very different type of question in the classroom and in the laboratory, when they return from their co-op jobs.

Students face many academic challenges in the classroom, and learn a great deal about themselves by being active in the university culture and environment. Similarly, we find that students grow professionally through their co-op experience. Students may have a tough time getting prepared for their first co-op interview, and pulling their resume together. On the other hand, by the time they get ready to graduate, we find that our students are far more experience in the job-search process than their competitors from other schools who have not had the benefit of co-op.

Student Organizations in Mechanical Engineering

We believe that students learn by doing. We support several co-curricular student organizations and competition teams in the department, and encourage our students to participate in these clubs and teams, as well as other teams and activities available across campus.

Formula SAE Autosports Competition Team

The RIT Formula SAE Racing Team is open to all majors and year levels willing to participate. Automotive knowledge is not required, just the desire to learn, work hard, and have a lot of fun. The team is constantly recruiting new members, and meets weekly on Saturdays at 10:00 am. Team members are always willing to talk about the race car, the Formula SAE competition, or give a tour of the RIT machine shop, where the FSAE office is also located.

Aero Design Team

The Aero Design Team at RIT has existed on campus for many years in a variety of forms. Beginning in the 2000-2001 school year the club was reorganized so that there could be greater involvement by underclassmen. Those involved in the restructuring wanted to provide an environment which would encourage student interest in the field of aerospace engineering regardless of year level.

The RIT Aero Design Team is a student chapter of the American Institute of Aeronautics and Astronautics (AIAA). Combined with RIT Formula, we are also a student chapter of the Society of Automotive Engineers (SAE). Being a university chapter of both AIAA and SAE creates many opportunities for our members. These include airplane design and manufacture competitions sponsored by both SAE and AIAA. Also, through our relationship with these two major engineering communities, opportunities exist for both undergraduate and graduate students to perform aerospace-related research and present technical papers at regional and national conferences, receive scholarship awards, and enter purely design-based competitions dealing with aviation and space problems.

The overall goal of the RIT Aero Design Team is to support and encourage student interest in the field of aerospace and aviation. We are centered completely around hands-on experiences. We look to apply engineering concepts learned in the classroom to real life problems. We do this in a variety of ways, but our primary effort at realizing this goal each year is the design and manufacture of a large RC plane for the SAE Aero Design Competition. This plane is a purely student led effort with little or no faculty involvement. It is a year long task ending with a trip to Florida for the East Coast Competition in April and a trip to California for the West Coast Competition in June.

Human Powered Vehicle Competition Team

Participates in the ASME/NASA Moonbuggy Competition team annually.

FIRST Robotics Team

Supports the Finger Lakes FIRST Regional High School Robotics Competition annually, and mentors local high school teams to compete in FIRST.

American Society of Mechanical Engineers

The student chapter of ASME offers educational, technical, and social activities. It develops leadership skills and leads to contacts with engineers in industry and students at other colleges within the region. The student chapter is active and works closely with the senior section in Rochester. The faculty advisor is Dr. Stephen Boedo [09-2167, ext. 5-2154].

Society of Automotive Engineers

The purpose of the RIT Society of Automotive Engineers [SAE] is to give students the opportunity to meet with senior engineers in industry and provide students a chance to apply their classroom knowledge in various projects. The faculty advisor is Dr. Alan Nye [09-2203 ext. 5-6121].

Society of Women Engineers

The Society of Women Engineers [SWE] at RIT is a student-run organization. SWE organizes several functions each quarter such as guest speakers, high school outreach, community activities, tours, social events and events with other student organizations. The RIT chapter is strongly committed to the encouragement of women in pursuing a career in engineering or related fields. The faculty advisor is Margaret Anderson [09-2117, ext 5-2971].

Society of Hispanic Professional Engineers

The Society of Hispanic Professional Engineers [SHPE] is an association of professionals and students in engineering, science, technology, business and other related disciplines at RIT. SHPE's basic thrust is to identify and promote professional growth opportunities for Hispanics. The faculty advisor is Dr. Patricia Clark [08-2206, ext. 5-6529].

National Society of Black Engineers

The student chapter of the National Society of Black Engineers [NSBE] is dedicated to the retention, recruitment, and successful graduation of its members. The faculty advisor is Mr. David Watson.

American Institute of Aeronautics and Astronautics

The student chapter of AIAA is dedicated to promoting careers and opportunities in the aerospace industry. The faculty advisor is Dr. Jeffrey Kozak].

Pi Tau Sigma

Pi Tau Sigma is the mechanical engineering national honor society. Membership, by invitation, is open to men and women ranked in the upper third of the class in their fourth and fifth years at RIT. Chapter activities are tailored to foster high ideals in the engineering profession, support departmental activities, and promote professionalism. Service activities are supported by fund-raising and social events. Membership is by invitation only, and is based is based largely on outstanding academic achievement. The faculty advisor for Pi Tau Sigma is Dr. Walter.

ME Student Advisory Committee

At the end of the 2001-02 academic year, we further expanded the role of the student constituents in our program evaluation and assessment, through formation of the Mechanical Engineering Student Advisory Committee, (ME-SAC). The ME-SAC is comprised of representatives from each student club, professional organization, and competition team in the mechanical engineering department, and also includes representatives from inter-departmental programs. Each incoming student leader, or an organizational representative in the case of inter-departmental groups, is invited to join the ME-SAC in a transition luncheon attended by the outgoing and incoming student members near the end of spring quarter of each academic year. Student organizations represented on the ME-SAC include ASME, AIAA, SAE, SWE, Pi Tau Sigma, The SAE Formula Team, The Aero Design Club, Engineering House, and soon the RIT Collegiate FIRST team. The ME-SAC meets approximately monthly with the department head in a lunch meeting.

Tau Beta Pi

This national engineering honor society was founded to mark in a fitting manner those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character as students in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in engineering colleges. Election to Tau Beta Pi is one of the highest honors that can come to an engineering student from his or her peers. Membership is by invitation only, and is based is based largely on outstanding academic achievement. The faculty advisor for Tau Beta Pi is Dr. Czernikowski

Student Support Services

Engineering Learning Center

The Engineering Learning Center is located in 09-1000 and is open 9am to 5pm Monday through Friday. If you have questions or problems with homework or assignments, this is the place to come. The ELC is staffed by College of Engineering faculty and students who will help you understand the course content. You will find a friendly atmosphere and a quiet room to study.

Academic Support Center

The Academic Support Center is located in the Eastman Building on the second floor. Services include Math Lab, Writing Lab, Study Skills, College Restoration Program, Academic Assessment, Learning Support Services, Academic Accommodations, Institute Testing Service, and Tutor Training. J. Wixson (Wick) Smith is Program Director for the Academic Support Center. Susan Donovan, is Interim Coordinator for Academic Support and Special Programs in the Division of Student Affairs.

Campus Ministries

Campus ministers for various religious traditions are available to students for religious services, personal counseling, and many program activities. For more information call 585-475-2135 [V/TTY]

Campus Safety

The Campus Safety Department is open 24 hours a day and provides escort service, lost and found, vehicle registration, medical/handicap parking permits, and public safety programs. For more information call 585-475-2853 [V], 585-475-6654 [TTY]. For emergencies call 585-475-3333 [V] or 585-475-6653 [TTY].

Counseling Center

The Counseling Center offers many services to RIT students, among which are personal and career counseling; alcohol/drug assessment, referral and educational services; and rape education and counseling. The services of the center are confidential and free. For more information call 585-475-2261 [V/TTY].

Disabled Students' Services [Office of Special Services]

The Office of Special Services offers specific services and support to students with a short-term or long-term physical disability and/or a learning disability. The goal of this office is to provide the necessary academic and personal support that will enable students who qualify to fully realize their potential and to successfully complete their college career. Eligibility for the program is determined by financial aid, physical or learning disability, and first generation college status. For more information call 585-475-2832 [V].

Minority Engineering Student Program

The mission of the Minority Engineering Program is to increase the enrollment of African-Americans, Hispanic-Americans, Native Americans, and Asian-Americans studying engineering, and to provide a supportive environment so that these students will continue their studies through graduation with an engineering degree. Various support activities are planned throughout the year which include guest speakers, group registration in calculus and physics, opportunities for mentoring with local professionals, and tutoring. For more information contact Rohan Palma, at 585-475-7436 [V] or 585-475-2145 [V/TTY].

Mechanical Engineering Graduate Programs

At the graduate level, we offer both the Master of Science (M.S.) and Master of Engineering (M.Eng.) Degrees in Mechanical Engineering. Both the M.S. and M.Eng. degrees are available for study in a dual degree program mode. During the winter quarter of their second year, undergraduate (B.S.) degree students are invited to apply for admission to the dual degree program. Those students who are accepted into this highly competitive, and demanding, program pursue a Bachelor's and a Master's degree concurrently. Students in the dual degree programs complete four co-op segments, rather than five, and typically spend a total of 14 academic quarters in classes. As the engineering marketplace becomes more globally competitive, we are finding that large numbers of our students elect to complete both the B.S. and the M.Eng. degree, to place them in a stronger position as they start their careers.

The Master of Science degree program has a strong research oriented focus, and is primarily directed towards students planning on completing a doctoral degree or advanced research careers in industry. All students enrolled in the M.S. program are required to complete a graduate thesis and conduct scholarly research. Students are required to complete two courses Math 1, Math 2, and must select one focus area from among three offered. Each student must then complete three core courses specified in their selected focus area. The department currently offers three focus areas including: Mechanics and Design, Systems and Controls Focus, and Thermo/Fluids Focus.

The Master of Engineering degree program has a strong career oriented focus, and is primarily directed towards students seeking additional technical training, career development, and broadening their skills base. The M.Eng. degree does not include a thesis. All students enrolled in the M.Eng. program are required to complete three courses: Math 1, System Modeling, and Computer Implementation of FEM. Students must select four concentration courses from one of numerous concentration areas. Possible concentrations include thermo-fluids, controls, design, manufacturing, business, and customized program of study. The concentration may be significantly interdisciplinary. By design, a student's program may range over several colleges of the Institute in assembling courses which will best help him or her meet his or her professional objectives.

Mechanical Engineering Research Programs

Research programs play an important part of high technology education, particularly at the Master's degree level. While RIT is not a traditional research oriented university, we insure that our faculty remain current in their professional discipline, and provide meaningful research opportunities for our dual degree and graduate students to pursue. Our research programs often involve undergraduate students to a far greater extent than those of many other mechanical engineering programs, and typically have a very strong applications-oriented focus. A few of the research programs that our undergraduate and dual degree students participate in are summarized here.

Micro-Channels and Mini-Channels

Since its inception in 1990 the RIT Thermal Analysis and Microfluidics lab has been driven by a keen desire to focus on some fundamental phenomena related to boiling in novel and creative ways. Starting with the detection of micron-sized bubbles under flow conditions to today's thrust in microchannels and interfacial phenomena in an evaporating meniscus, the lab continues to contribute to the thermal and microfluidics field.

Energy Systems

Department faculty conduct applied research and development in the areas of design and performance analysis of Turbomachinery, Refrigeration and Air-Conditioning systems, and exergetic analysis of energy intensive systems. Faculty and students work on alternative cooling technologies, co-generation systems, and fuel cell technology.

Unmanned Air Vehicle Systems

Department faculty conduct applied research and development in the areas of navigation and control, airframe design, mini-turbine power generation and propulsion systems, and stability augmentation.

Aerosol Mechanics in Biological Systems

Scholarly activity is directed towards developing a series of increasingly sophisticated lung deposition models to accurately account for morphology, air flow patterns, subject breathing variability's and particle dynamic behavior. The models may be used to predict carcinogen specific dosimetry, human risk assessment and toxicology relationships for all ages, specifically children with healthy and diseased lungs such as patients with asmtha, bronchitis or other chronic obstructive pulmonary disorders.

Tribology and Lubrication in Microsystems

Current research studies the interaction of thin lubricant films with structurally compliant surfaces, including effects of geometric irregularity, lubricant supply, and lubricant cavitation on predicted mechanical system performance.

Performance of Novel Materials

Faculty conduct research on fatigue life prediction and reliability in the aerospace industry, and are expanding their focus to include biomaterials. Current projects include fatigue in gas turbine engine materials; and characterization of diffusion bonded alloys. Theoretical work includes analysis of composite drive shafts with integral shaft couplings.

The Mechanical Engineering Department Staff

Diane Selleck maintains all of the undergraduate student records. You may ask her general questions regarding the undergraduate program, academic calendar, and various deadlines. Diane is responsible for handing out departmental forms, such as Drop/Add, Withdrawal, Application for Graduation, Application for Co-op Work Experience Credit, Request for Repeat of Course, etc. Diane is located in Building 9, Room 2203, at extension 5-2163.

Sheila Garwood, the ME Staff Assistant, schedules all appointments for students to see the Department Head. The staff assistant maintains the Department Head's calendar, schedules the conference room, provides general departmental information, and distributes paychecks to all students employed in our department. The staff assistant is located in Building 9, Room 2203, at extension 5-2162.

Connie LaBarre also supports the Department Head and Associate Department Head, as well as the dual degree and Graduate Studies Program. Her office is located in Building 9, Room 2203 and her extension is 5-5181.

David Hathaway, assisted by **Steven Kosciol**, is responsible for teaching materials processing labs, supporting design projects, and maintenance and repair of the equipment in all of our labs. Student technicians, who work full-time in the department, report to him as frequently they work in the Machine Shop and PC Lab. David is responsible for all use of the machines in the shop area. Before students begin any project work, they should please see Dave or Steve. Dave is located in the machine shop area of Building 9, Room 2361, at extension 5-2184.

William Finch is the Systems Administrator for the Department. He is in charge of the ME computer labs, their maintenance and upkeep. Bill also is the supervisor for the lab assistants who work in the computer labs. His office is located in Building 9, Room 2242 and his extension is 5-2964. Bill can assist with questions about personal computer selection and configurations for students.

Mechanical Engineering Department Faculty

The faculty members of the Mechanical Engineering Department are deeply committed to engineering education. Numerous members of our faculty have received awards in recognition of their excellent teaching and mentoring of engineering students. They remain current in their discipline through a wide variety of professional development, service, and scholarly activities. Our faculty members regularly publish materials on advances in engineering education as well as their fields of research.

Lawrence Agbezuge, D.Sc., MS, Columbia; BS, Ghana Imperial College — Visiting Associate Professor
Dianne M. Amuso, BS, Western New England College; MS, Rensselaer Polytechnic Institute—Lecturer
Margaret Bailey, BS in Architectural Engineering, The Pennsylvania State University; Ph.D., University of Colorado at Boulder—Kate Gleason Associate Professor.
Stephen Boedo, BA, State University of New York at Buffalo; MS, Ph.D., Cornell University—

Associate Professor
Richard G. Budynas, BME, Union College; MS, University of Rochester; Ph.D., University of Massachusetts; P.E.—Professor
Agamemnon L. Crassidis, BS, MS, Ph.D., State University of New York at Buffalo—Assistant Professor
Elizabeth A. DeBartolo, BS, Duke University; MS, Ph.D., Purdue University—Assistant Professor
Hany A. Ghoneim, BS, MS, Cairo University, Egypt; Ph.D., Rutgers University—Professor
Amitabha Ghosh, B.Tech., M.Tech., Indian Institute of Technology, India; Ph.D., Mississippi State University— Professor
Surendra K. Gupta, B.Tech., Indian Institute of Technology, India; MS, University of Notre Dame; Ph.D., University of Rochester—Professor
Charles W. Haines, AB, Earlham College; MS, Ph.D., Rensselaer Polytechnic Institute—Associate Department Head; Professor
Edward C. Hensel, BS, Clarkson College; MS, Ph.D., New Mexico State University —Department Head; Professor
Satish G. Kandlikar, BE, Marathwada University, India; M.Tech., Ph.D., Indian Institute of Technology. James E. Gleason Professor
Mark Kempski, BS, Purdue University; MS, Ph.D., State University of New York Buffalo—Professor
Kevin Kochersberger, BS, MS, Ph.D., Virginia Polytechnic Institute and State University—Associate Professor
Jeffrey D. Kozak, BS, Gannon University; MS, Ph.D., Virginia Polytechnic and State University of Virginia—Assistant Professor
Alan H. Nye, BS, MS, Clarkson College; Ph.D., University of Rochester—Professor
Ali Ogut, B.Ch.E., Hacettepe University, Turkey; MS, Ph.D., University of Maryland—Professor
Elizabeth Paciorek, BS, State University of New York at Buffalo; MS, University of Rochester—Lecturer
Brett J. Pokines, BS, MS, State University of New York Buffalo; Ph.D., Virginia Polytechnic Institute and State University—Assistant Professor
Risa J. Robinson, BS, MS, Rochester Institute of Technology; Ph.D., State University of New York at Buffalo—Associate Professor
William T. Scarbrough, BS, MS, Rochester Institute of Technology—Lecturer
Frank Sciremammano Jr., BS, MS, Ph.D., University of Rochester—Professor
Josef S. Torok, BS, University of Akron; MS, Ph.D., Ohio State University—Professor
Benjamin Varela, BS, Institute of Technology of Juarez, Mexico; MS, Ph.D., New Mexico State University—Assistant Professor
Panchapakesan Venkataraman, B.Tech., Indian Institute of Technology; MS, Ph.D., Rice University—Associate Professor
Wayne W. Walter, BE, State University of New York Maritime College; MS, Clarkson College; Ph.D., Rensselaer Polytechnic Institute; P.E.— Professor
John D. Wellin, BS, Rochester Institute of Technology; MS, University of Rochester—Lecturer

Recent Employers of Mechanical Engineering Students

The table below is a partial list of employers who have recently hired R·I·T Mechanical Engineering Co-op Students and Graduates.

Aerospace & Defense	**Automotive**	**Bioengineering / Biomedical**
Boeing	Harley Davidson	Atlantic Testing Laboratories
Joint Warfare Analysis Center	ITT Automotive	McNeil Consumer & Specialty Pharmaceuticals
NAVAIR	Moog	Wilson Greatbatch Technologies
Raytheon Company	New Venture Gear	Bausch & Lomb
US Navy	TRW	Johnson & Johnson
US Air Force	GM	
US Marine Corps	GM Truck and Bus	**Manufacturing**
Defense Intelligence Agency	Valeo	
Aeronca	Volvo (Sweden)	MARKEM Corporation
Aerospace Corp.	Borg Warner	AMP
Allied Signal Aerospace	Robert Bosch Corp.	Gleason
Amphenol Aerospace	Cummins Engine	Dresser Rand
Boeing (PA, WA, & CA)	Delphi Automotive	Alstom Signaling
Carleton Technologies	Ford	Eastman Kodak
Flightline Electronics	General Motors (Several loc's)	Hansford Manufacturing
General Dynamics	Pactiv	Black & Decker (Emhart Power)
Goodrich Aerospace	**Energy Systems**	General Electric (Several loc's)
Hexcel Pottsville Corp.	Barton and Loguidice, P.C.	Harris Corporation (RF Comm)
Lockheed Martin	BME Associates	IBM (Several locations)
Moog	c3controls	INSA (France)
Naval Air Warfare Ctr.	Carrier Corporation	ITT/Goulds Pumps
Northrup Grumman Corp.	Rochester Gas & Electric	Johnson Controls
Parker Hannifin	**Other**	Motorola
Pratt & Whitney	Everest VIT	Raymond Corporation
Raytheon Aircraft	Infineon Technologies	Valmet Paper Machines (Finland)
PC Sierra Technologies	Keyence Corp. Of America	Xerox Corporation
Sikorsky Aircraft	NanoDynamics, Inc.	
Tactair Fluid Controls	Optical Gaging Products	
Teradyne	Garlock	
TRW Lucas Aerospace	Peko Precision Products	
Parker Hannifin		