

EMPLOYER TYPE

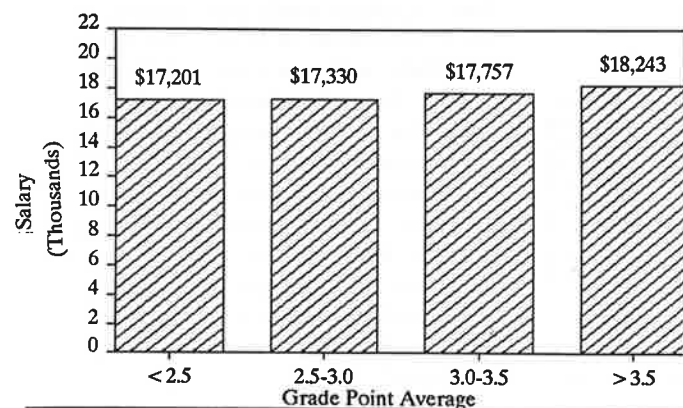
Manufacturing firms, where 82% of the engineering graduates are employed, paid the highest salaries, averaging \$17,962 (real) over the last eight years. Within manufacturing, salaries varied widely with automotive (\$18,495) and aerospace-petroleum (\$18,280) companies paying the highest salaries. electronics firms and chemical and electrical companies paid \$17,983, and \$17,981, respectively. Slightly lower were construction and food processing (\$16,131) and transportation organizations (\$16,492).

Engineers were also employed by consulting firms who paid an average \$16,494. Government agencies at all levels, including the military, offered salaries of approximately \$15,395. The service sector employed a small number of engineers, primarily in medical services, merchandising, marketing, and communications, at an average of \$16,048. Only a few engineers elected to teach, usually at junior colleges. Their average salary was \$15,657.

GRADE POINT AVERAGE

Generally it is assumed that graduates who have demonstrated higher academic achievement receive higher salaries. Based on the averages presented in the accompanying chart, this assumption holds true for engineers. There is a positive relationship between grades and salary. The lowest salaries were

Figure 6: Engineering Salaries (real) by Grade Point Average



reported by engineers with grades below 2.5 (\$17,201 real) and the highest salary by those with GPA's above 3.5 (\$18,243 real).

ETHNIC GROUP

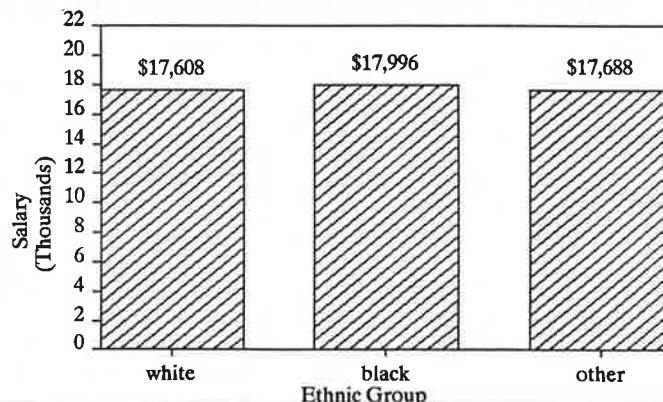
The average starting salaries for major ethnic groups are reported in the accompanying chart. The number of Hispanics and Native Americans reporting salaries was small, introducing a problem of how representative these figures were. Black and White Graduates had average starting salaries for the eight year period of \$17,996 and \$17,608 (real), respectively. The other minorities combined average salary was \$17,688.

CONCLUSION

Starting salaries for new engineers were affected by inflation. During the early 1980's, annual salary increases fell slightly short of the inflation rate. For some engineering majors, improvement in economic conditions since 1983 has resulted in healthy salary increases, returning real salaries to their 1979 levels. Other majors have not seen noticeable changes during the recovery. A distressing finding was the leveling off and actual decline in real salaries in 1985-86.

Graduates from this period have seen the purchasing power of their salaries eroded; but not to the extent of other majors within the university. The inability of salaries to keep pace

Figure 7: Engineering Salaries (real) by Ethnic Group



with inflation may require new graduates to alter their expectations until adjustments in their salaries can be made.

An important finding concerned the small gap in salaries between men and women. In several engineering disciplines, women actually received higher salaries. At the "starting gate", women and men are on equal footing in terms of salary. More women, however, need to be encouraged to participate in the higher paying engineering fields, particularly electrical and chemical engineering, where they are under-represented (based on graduation rates).

The engineering labor market is very competitive, making location a critical element in the decision to accept a job. Michigan's economic problems in the early 1980's caused engineers trained in the state to look at opportunities in other parts of the country. The erosion of Michigan salaries stopped in 1983, creating opportunities for engineers to stay in the state. Michigan's economy, however, remains soft as reflected in the 1985-86 figures that revealed new engineers in the state absorbed all the loss in income from 1984-85 levels.

Collegiate Employment Research Institute

Starting Salary Trends for Engineering Graduates of 1978-1986

Salary Bulletin No. 2

August, 1987

INTRODUCTION

Engineering majors generally receive excellent starting salaries upon graduation. Remuneration in engineering can be \$7,000 to \$10,000 higher than starting salaries of education and social science majors, for example. Nonetheless, engineering salaries can be affected by economic conditions, including inflation, that have recently dampened the salary position of college graduates (see Bulletin No. 1). Common questions, asked by those planning a career in engineering, are: "Have the starting salaries for new engineers kept pace with inflation?" and "In what regions of the country do engineers receive the highest salaries?" These questions are addressed in this bulletin, as well as other factors that may influence an engineer's starting salary.

This bulletin summarizes Salary Report No. 4 Starting Salary Trends and Analysis: College of Engineering, 1978-1985 (available from the

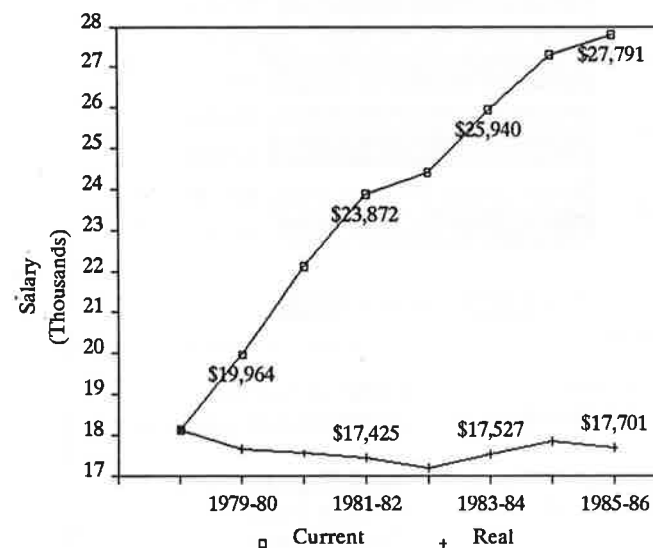
Collegiate Employment Research Institute), plus data from the 1985-86 graduating class.

STARTING SALARY TRENDS

The average starting salary for engineers in 1978-79 was \$18,136 (current dollars) and has risen steadily to \$27,791 in 1985-86. Annual increases have ranged from 493 to \$3,975 or 2% to 11%. After showing two strong years of growth of 10% or more between 1978-79 and 1980-81, the annual increment of change in salary declined to an average rate of 5%. This rate was strongly influenced by two rather lack luster years in 1982-83 and 1985-86.

After adjusting starting salaries for inflation¹, the actual salary position of engineers deteriorated from 1978 to 1983 when salaries dropped 1% in each of three periods and 3% in another (1978-79 to 1979-80). In other words, the annual increases of 10% (in current terms) did not cover inflation. Actually, engineers did

Figure 1: Average Starting Salary All Engineering Graduates (Current and Real)



much better against inflation than graduates from other majors, as the overall average (university) was closer to

¹The CPI index has been calculated for the annual period from July to June which closely approximates the academic year. For the academic year, 1980-81, the period covers July, 1980 to June, 1981. The 1978-79 year equalled 100 in the index.

3% below the inflation rate for each of these time periods.

Inflation came under control around 1982 and the economy began to perform better. As a result, average starting salaries increased at a rate slightly ahead of inflation in 1983-84 and 1984-85, (2% in each period). Salaries leveled off, however, in 1985-86, again falling behind inflation. The 1985-86 average salary (real) of \$17,701 was approximately 2% below the 1978-79 average.

Engineering graduates, particularly from 1979 to 1983, have experienced an erosion in what their salaries would purchase compared to engineers from 1978. Today, even after several years of healthy salary increases, engineers are no better off financially than graduates of the mid-1970's. Engineering graduates can find some solace in that they are doing much better than their peers in other majors. The only apprehensive aspect, reflected in the trend data, would be the small decrease in salary for 1985-86. This may be reflective of short-term adjustments in the engineering labor market or indicative of longer term changes that will constrict the opportunities for engineers.

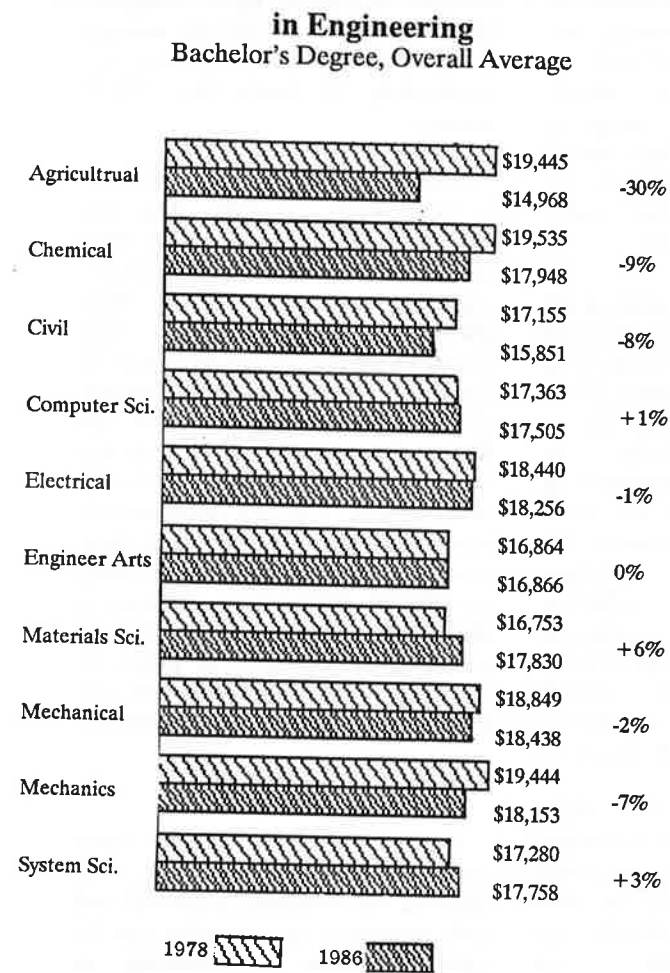
ACADEMIC MAJOR

Not all engineers face the same conditions in the labor market. The demand for chemical, electrical and civil engineers, as examples, can be quite different. According to average salaries over the eight year period, chemical engineers had the highest salaries (\$18,729) followed by electrical (\$18,297), and mechanical (\$18,230) engineers (real figures are used unless otherwise noted). Starting salaries for engineering arts (\$16,374), civil (\$16,203), and

agricultural (\$15,783) graduates are at the lower end of the salary scale. mechanics (\$17,821), system science (\$17,456), material science (\$17,536), and computer science are situated in the middle.

Annual changes in starting salaries varied by academic major, reflecting different employment markets encountered by their respective graduates. The accompanying chart provides 1978-79 and 1985-86 average salaries (in real dollars) for each major (salary reports began in 1979-80 for material science and 1980-81 for mechanics graduates).

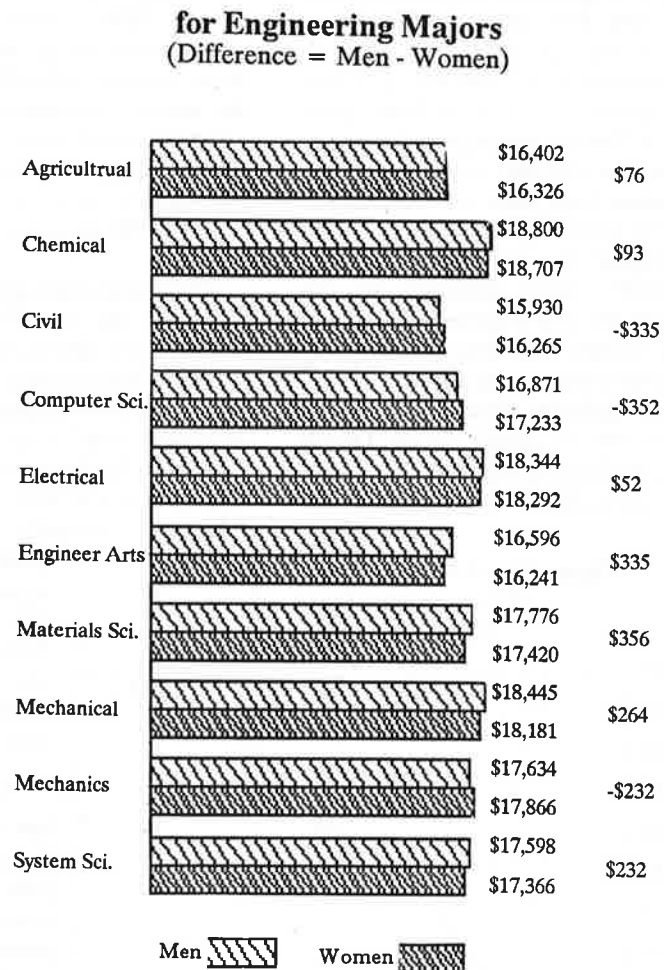
Figure 2: Salary (real) by Academic Major



The percentage figures indicate whether salaries in 1986 were below or above the 1978 level. Some care should be taken in interpreting these results as the sample sizes for several majors (agricultural engineering, material science, mechanics, and system science) were small.

Except for computer science, engineering arts, material science, and system science graduates, 1986 salaries lagged behind 1978 levels; in some cases by substantial margins. In part, these differences can be attributed to the downturn in salary experienced by some majors during

Figure 3: Average Salary (real) by Gender



1986. Chemical and electrical engineers saw salaries dip by nearly 3% below the inflation rate, negating several years of small, yet steady increases above inflation. On the otherhand, civil engineers, engineering arts and system science graduates made substantial improvement in their salaries, ranging from 2% to 5%. Agricultural engineering graduates continued to see their salaries erode, declining 10% in 1986 from 1985.

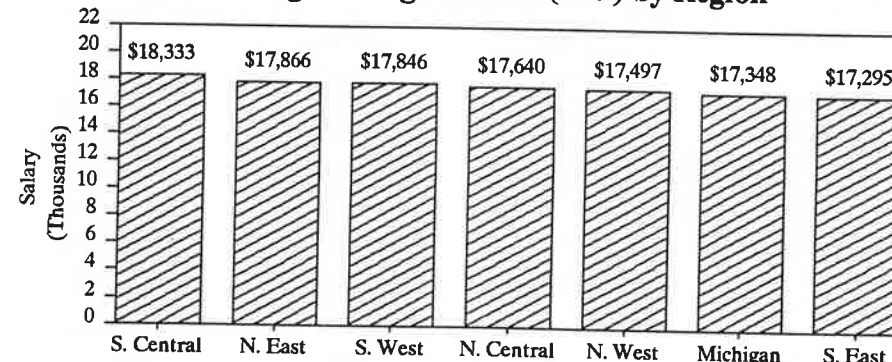
GENDER

The overall average starting salary for men was \$17,659 and for women, \$17,842. These averages mask some important differences within specific majors. For many majors, women enjoy a salary advantage in seven of the ten majors. Higher women's salaries in agricultural engineering are deceiving, as no women (reporting salary) have graduated in the last several years; the male average has taken the brunt of recent market conditions. Fewer women (proportionally) in the high paying majors of chemical and electrical engineering and more in lower paying fields of engineering arts and computer science explains why the overall men's average has remained higher than the women's average.

Men have generally had higher starting salaries in all years of the study with the exception of 1980 and 1982. The salary gap has ranged from \$97 to \$475. While the gap has been shown to be statistically insignificant, a disturbing fact is that the gap has widened in recent years to approximately \$350. Again, this trend can be traced, in part, to the distribution of women across engineering majors: they tend to be graduating from lower paying majors.

Over the years, inflation has affected both gender's salaries. Between 1978 and 1983, women's salaries eroded by approximately 4.5% while men's declined by over 5%. Men's salaries recovered slightly faster than women's when economic conditions improved in 1983, over 3% for men and 2% for

Figure 4: Engineering Salaries (real) by Region



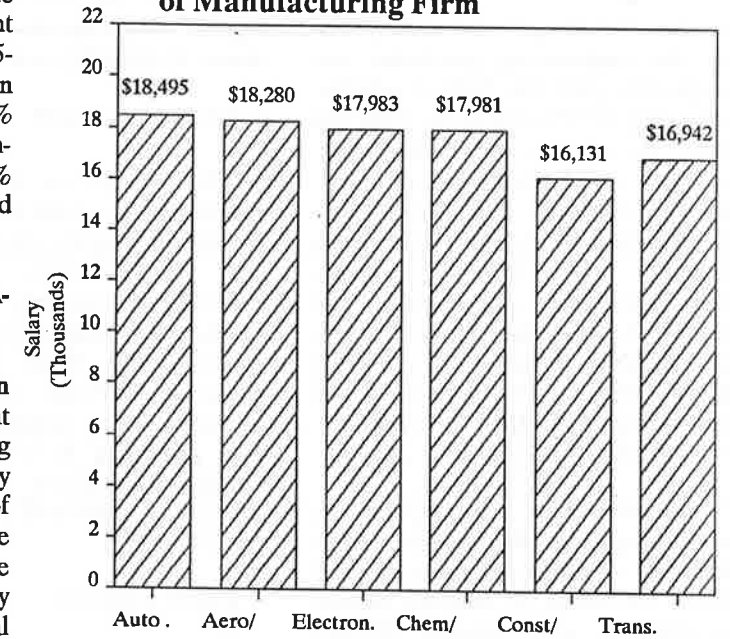
women. These latter figures include the recent downturn in 1985-86 where women experienced a 1% decline as compared to the .8% decline reported by men.

JOB LOCATION

Location can play an important role in setting starting salary levels. Cost of living and the strength of the regional economy are two locational aspects that are often factored into starting salary offers. In this report, adjustments have not been made for these conditions in the reported averages.

The overall average starting salary for engineers working in Michigan was \$17,348 (real), \$450 less than the reported out-of-state average of \$17,799 (real). When Michigan's economy weakened in 1980, the locational salary difference increased from \$178 (real) in 1978-79 to nearly \$1,400 (real) in 1980-81. The improvement in economic conditions over the last several years (1983 to 1985), the difference has shrunk to \$92. One change that accompanied the economy's improvement was that more engineers found opportunities in Michigan: in 1981, 70% of en-

Figure 5: Engineering Salaries (real) by Type of Manufacturing Firm



gineers, reporting salaries, worked outside the state, by 1985 this percent leaving had dropped to 50%.

The salary decrease (real terms), experienced in 1985-86, was borne by engineers remaining in Michigan who saw salaries decline by 2% from 1984-85 levels. In comparison, 1985-86 engineers from outside Michigan reported salaries that were about .5% higher than the year before. As a result of these changes, the locational salary difference increased to \$492.

Engineering graduates are accepting positions in every region of the country. Popular areas include the northcentral (Great Lakes states other than Michigan), northeast, southwest, and southcentral regions. Starting salary levels were highest in the southcentral (\$18,333), northeast (\$17,866) and southwest (\$17,846). Centers for high technology development that are attractive to engineers are located in these regions. The accompanying chart provides information on overall average starting salaries for the six regions and Michigan for the eight year period. Michigan's salaries fell at the lower end with the southeast and northwestern.