

Professional Engineers' Career Prospects

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What are the career prospects for a young professional engineer, and what kind of remuneration can he expect throughout his working career? These are some of the problems discussed by the author, who separates remuneration patterns into merit, cost of living and betterment. In recent years, there has been an increasing supply of graduate chemical engineers and this has resulted in a drop in remuneration, in relation to that of other engineers. Some of the incentives necessary to motivate professional employees to higher productivity are listed.

YOUNG engineers see themselves as future senior executives, managers and directors. What matters is the extent to which one is in charge of one's own work and that of others, and this increases through senior to supervisor, through manager to director. Increasing scope for managing means increasing responsibility, and with it correspondingly greater rewards. Greater job satisfaction is combined with higher remuneration and the attraction of managerial and higher management positions arises from this combination, bearing in mind the status which the title and associated spending power give in the community. The positions available are few and competition keen.

The young graduate starts with a more or less haphazard choice of employment. He needs to choose between operation, plant management, plant construction, plant design, technical versus managerial work, construction as compared with operation. Young graduates are enthusiastic and cheap professional manpower, and are thus in great demand, so that their first job may well be settled by the salesmanship of recruiting executives. Larger employers like to recruit straight from university or college, often for 'purpose of training and selection' through a training scheme, which is almost invariably time-wasting. The smaller company can offer a broader range of work, a good measure of responsibility and work satisfaction, but the smaller the company the lower the level of the highest position attainable. Larger companies seem to offer career prospects which appear to reach much higher levels of project size, of responsibility and reward. But work is far more departmentalised, more restricted in scope and of narrower width. What matters are the possibilities to gain experience, conditions of employment and career prospects.

Remaining with one employer continually would weigh the scales heavily against the employee. There may come a time when his progress is barred through his limited narrow experience which makes him virtually unemployable elsewhere. Since he may have considerable difficulty in obtaining another appointment he is more or less tied to his first employer. Moving from employer to employer while young broadens outlook, gives depths of

experience extending over different companies and activities.

For good grounding in their own field, graduates should start with a smaller company, to gain experience over much of their professional field. One could then aim at joining a large company in senior capacity, later moving to a smaller firm as long as work with the large company was not too specialised or too restricted in scope. To start with a large employer may be difficult at a later stage of life, particularly if satisfying work and responsibility are aimed at. Titles can be misleading, since the chief engineer of a small company may have less responsibility and lower income than a senior engineer in a larger company.

The good manager sets an example and forms those who work for him and who will model their behaviour on his. Working for a good manager will further the subordinate's career, while working for a bad one will retard or finish it. Turnover figures speak for themselves. But young professional engineers and managers are generally under-employed, doing work that could well be done by those less experienced and less skilled. The incentive to do well is reduced and the professional content of their work is downgraded. Their progress is limited. Typically, a recent survey of young mechanical engineers¹ concluded, 'Members feel that their social and financial status needs improving, that the nation's technically-trained manpower should not be so under-employed, that their Institution was doing nothing for them'. Again, chemical engineers in the US⁵ are being assigned functional duties which could be carried out by less-qualified technologists.

Career prospects

Just under half of the mechanical engineers¹ aimed at being senior executives by the age of 45-50. About one-fifth of those in larger and about two-fifths in smaller firms aimed at being directors by that age. An analysis of salary progressions indicates that people are soon graded within their profession, and that from then on their remuneration increases in well-known manner. The engineer is called 'senior' when he reaches the corresponding salary. To advance he must progress in relation to his colleagues, and this is determined by the openings and op-

portunities available to him. Thus a good many of those who hope to be senior executives may find themselves senior engineers. While ability controls the change to senior engineer, it is the available openings which are of equal or greater importance for promotion to managerial work. It does not take long before young engineers sense the career restriction of doing technical rather than managerial work. Young electrical engineers² realise within a very short period of time that the surest road to top management lies through accountancy and sales together with, in third place, family connections. Those who carried out the survey concluded that many young engineers are dissatisfied with their prospects. American engineers assign considerable importance to the freedom to manage their own work, and to the opportunity to move into a management career.⁶ The engineer, like other professional employees, finds that the professional content of his work is slowly disappearing, that he is more of a technologist doing unskilled routine work which could be done by someone less qualified.

Remuneration pattern

There are certain definite patterns of remuneration, from which we can determine how people stand in relation to each other and how the differential between them is changing. This is at the level of cold, hard fact when one uses National Remuneration Scales. These indicate a person's progress, promotion and demotion, and how groups fare in relation to each other. We can compare those who are successful with those who are only moderately successful, and see what is happening to the differential between them.³ The manual employee receives the rate for the job and this does not depend on age. The professional employee's experience and his ability to judge and to decide increase as he grows older and his income depends on age. This dependence of income on age is a

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basic difference in the pattern of remuneration between professional and manual employees. Professional employees have lost considerable ground in relation to manual employees, and also are losing ground when compared with directors and top managers.

A person's experience, responsibility and remuneration increase in known progression, limited by his ability and restricted by the available openings.⁴ The more successful get smaller percentage increases than their less-successful colleagues. The difference between income for good and indifferent work is being eroded. The younger receive larger percentage increases than their older colleagues. At £2,000/a the rate of increase is about twice that at the £4,000/a point. Two men can be hired at £2,000 each for the cost of one at £4,000, and there is a greater demand for younger men. In addition, younger employees are more mobile. Hence younger administrators, although less experienced, do rather better than older ones. Again there is now less incentive to do well since annual salary increase is reduced when the difference in salary between young and old gets smaller.

The professional employee works year by year at a higher level of responsibility; gaining experience and utilising it. He receives higher pay for increased responsibility, but only manages roughly to maintain his position. The important point is that he has to work at an ever-higher level of responsibility just to stay in the same place, and as a result he sees no corresponding increase in reward. The overall picture of professional employees is: (a) they are losing ground to manual employees, and to their own employers; (b) their reward for doing good work gets less, so that less value is put on ability; and (c) their rewards for experience are also reducing.

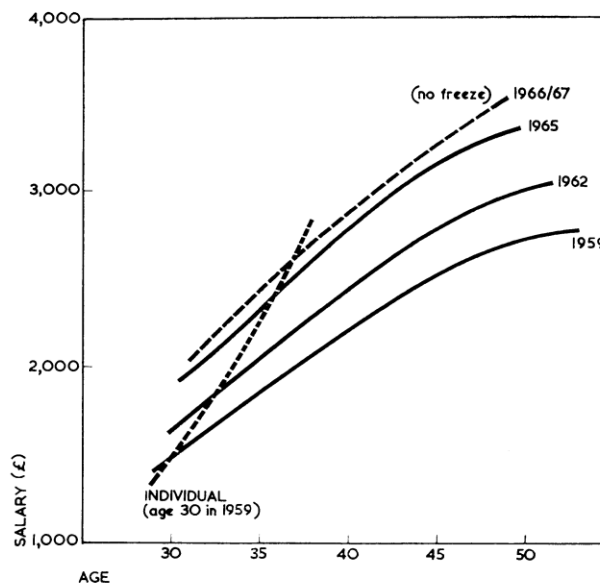
The trends indicate a change from professional towards more routine (manual) types of work and payment, with the result that professional employees engage in more militant political and union activities so as to maintain their position.

Remuneration

Remuneration is salary for full-time employment, but fringe benefits amount to about 10 and 20% at a basic salary of £2,000 and £4,000/a, respectively, and should be considered. Most common in UK are superannuation contributions by employer, life assurance, use of company car, loans and assistance with house purchase, subsidised lunches and telephone allowances, as well as club and professional membership fees. Hours worked as well as time off, that is holidays, are an essential part of remuneration. The 18 working days commonly given in the UK is pretty nearly at the bottom of the Western European pattern, being only half that given in Italy.

The salary received by chemical engineers is illustrated by Fig. 1, for those of average standing in their profession. It applies to chemical engineers of grade G50 who earn median salaries. In other words, 50% of engineers of any particular age group have a salary which is equal to, or less than, that given by the remuneration curves. Fig. 1 shows how the remuneration

Fig. 1. Change in remuneration pattern of median chemical engineers



of these engineers has changed in time, which assumes salaries unrestricted by the wage-freeze. Each curve is a remuneration scale for this grade of engineer, applying to a particular year. The horizontal axis is also a scale of responsibility⁴ and a particular position worth £2,510/a in 1959 increased its worth as follows:

1959	..	£2,510
1962	..	£2,790
1965	..	£3,150
1966/67	..	£3,300

This increased worth, given by vertical increments between remuneration scales (Fig. 1), results from general inflation and from a higher standard of living. A vertical increment represents, to an individual, an increase which includes higher cost of living due to inflation, and also includes betterment, where betterment is advance of earnings over increased cost of living, and is his share of any increase in the national cake.

The remuneration scale shows how the remuneration of the employee increases as he grows older, as he gains experience and works at a higher level. The scale states the merit increase he receives annually in accordance with the professional work he is doing.

The progress of an individual, of the grade to which the scales apply, can be shown on this kind of scale, as illustrated by Fig. 1. An engineer, 30 years old in 1959, then earning £1,470 is of grade G50 and thus the scales apply. He would be earning £1,870 in 1962, then 33 years old. His salary in later years can be similarly estimated. Table 1 lists the total increases this individual would receive, separating merit increases from the increased worth of the work he is doing, showing the betterment once the increase in cost of living is deducted, and thus showing the extent to which the job and the individual share any increase in the national cake.

The government allowed salary increases to be given only for genuine promotion or an increase in responsibility, except where regular increments of specified amounts within a predetermined scale became due. Annual increments have continued to be

given in the civil service, in local government and in nationalised industries, and it has been estimated⁸ that 5.5 million people, more than one-fifth of the working population, were still obtaining rises.

The merit increase given to professional employees is reward for working at a higher level, for working at a greater level of professional proficiency due to increased experience and thus reward for working at a higher level of responsibility. These merit increases are regular increments of specified amounts, specified by remuneration scales such as those illustrated in Fig. 1, detailed on National Remuneration Scales⁹ which apply to professions as a whole. These merit increments should have been received by professional employees.

There is, however, no compulsion to freeze profits or dividends. Profits which are retained instead of being paid out as dividends are available to shareholders at a later date at the discretion of the directors, either as capital gain or as increased dividend. No such reserves are accumulated when the salaries and wages of professional and manual employees are frozen. The result of a wage and salary standstill is a permanent change in differential between those affected by the freeze and those who are not.

The data in Table 1 for 1966/67 was estimated assuming no salary standstill. The salary freeze has meant no increase in business and industry while prices have been allowed to increase much as before. Hence at the end of this year of prices/incomes squeeze the professional employee in industry works at a higher level without getting paid for it (a loss of £100 to the engineer whom we are considering as example) and in addition the increased cost of living due to higher prices has absorbed some (£80) of his salary at the beginning of the year. In spite of working at a higher level of responsibility the purchasing power of his salary has dropped markedly, and this applies particularly to business and industry.

The result has been that the professional employees in business and industry have

been caught in an intentional incomes/prices squeeze which has reduced their standard of living compared with other sections of the community such as civil servants and shareholders. This is no way of encouraging professional employees to increase productivity, just as they cannot be persuaded to increase productivity by closing the doors to the emigration of those who can get better pay abroad.

The solution is the same in both cases, namely to motivate by providing incentives. While there may have been some point in withholding the betterment, merit increases should have been given and the increases in the cost of living should have been covered by corresponding increases.

Increase the supply of professional employees, such as engineers, and their remuneration drops. Conversely, reduce supply and the price increases. Doctors underestimated the training facilities which would be required. As a result doctors are now doing well indeed. Actuaries keep themselves in very short supply, hence actuaries are amongst the most highly-paid professional employees. Teachers are continually listening to the loudly-publicised need for more teachers, but no one is prepared to pay teachers more, so as to attract better entrants to the profession.

The recent Triennial Manpower Survey⁷ defines 'demand' with respect to the community's (and in particular the employers') willingness and ability to pay. 'Need' is defined in relation to stated objectives of an organisation or community. There may be a need for more engineers because we would like to maintain our economic and technological superiority over our competitors, but if no one is prepared to pay adequately for their services, then the demand is not there. Only a shortage of engineers in relation to demand can increase their remuneration. Only increasing remuneration indicates increasing demand.

There are fewer chemical engineers than other kinds. Demand exceeded supply but teaching facilities were expanded, and the number of chemical engineers coming on to the market annually is now much bigger. More young chemical engineers are doing less-skilled work, not liking this at all, while the remuneration of chemical engineers as a whole has dropped

markedly in relation to that of other engineers. American companies⁵ often use chemical engineers on sub-professional simple technical work, or routine clerical tasks and one of the results has been that there are 'too few students enrolling since 1957'.

More chemical engineers were needed so training facilities were expanded, with the result of reduced remuneration for the profession as a whole. If the demand for their services had been there, they would have maintained their position.

There is only one test of validity of demand, and that is the remuneration offered, namely that someone is prepared to pay more for having this kind of work done. The pay increases must come first. Only when remuneration has increased substantially can one say honestly that a demand for more practitioners of that profession exists. This applies the only sincere test of validity. Any request for increased numbers of any particular profession, not backed up by immediate substantial rises in remuneration, is a demand for cheaper labour which will downgrade the profession as a whole.

Management barrier

The engineer is looking for promotion, in real terms, to a management position and responsibility. The goals are clear, rewards are high, and there is intense competition. What chance does an engineer have of getting there and then of staying there? Is the game worth the candle? While a senior position can be obtained by virtue of one's experience increasing as one grows older, it is not so easy to become a director. A good deal is known about directors as a group. For instance, to become a director while reasonably young requires a public school education, which is far more important than a university education. Towler² showed that even so far more arts graduates and accountants make the grade when compared with engineers and scientists.

Directors are elected by shareholders, who almost always accept those nominated by their existing board. There is a tendency for like to choose like, the dice pieces are heavily loaded against the engineer pleasing the board.

At the top there is a good deal of insecurity for some. Growing numbers of

middle-aged, top-ranking executives find themselves jobless in their fifties with small incomes and considerable liabilities. Their experience is now of less value as it is specific, technical or administrative, rather than general, managerial or board-room experience.

On the one hand we have professional employees, such as engineers, who find that they are backroom 'boffins', and that because of this the road to the top is barred. If by exceedingly hard work and loyalty they manage to work their way up to near the top then, during their fifties, they face dismissal because their technical experience is slowly getting out of date or because such executive work as they do can now be done more cheaply by a younger executive.

The able engineer finds that he is under-employed and not working at the height of skill and ability of which he is capable. If he succeeds he may well find himself out of employment in middle age. It is not surprising that instead of job satisfaction in business and industry, we find apathy and frustration, due to lack of incentives.

Incentives

There is as much frustration among engineers as among other professional employees. It arises from the work they are asked to do, from the way in which it is organised, from the lack of incentive to do well. What we need primarily are not large numbers of fresh graduates but to utilise the potential of those who are not working at full capacity and ability, and to provide incentive payments for professional experience and excellence.

We need to increase productivity generally and to motivate those who are professionally employed towards this end. We have seen the kind of incentives which provide the necessary drive, namely:

- (1) Merit increases, defined by National Remuneration Scales, given as a matter of course.
- (2) Additional automatic cost of living increases.
- (3) A separate betterment increment which provides direct participation in the country's prosperity.
- (4) A share in increasing national wealth through shorter hours and longer holidays.
- (5) Additional security to provide greater mobility through
 - (a) fully transferable pension rights, and
 - (b) redundancy payments related to levels of professional remuneration, allowing for the greater difficulty of finding alternative employment due to greater specialisation.

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Table 1. Component increases for the G50 chemical engineer

Year	Age	Salary ² (£/a)	Increase ²			
			Merit (£)	Increased worth		Total (£)
				Cost of living (£)	Betterment (£)	
1959	30	1,470	220	130	50	400
1962	33	1,870	260	190	90	540
1965	36	2,410	100	80	50	230
1966/67	37	2,640 ¹				

NOTES 1.—Income for 1966/67 is estimated by ignoring salary standstill so that increases given for period 1965 to 1966/67 are those which would have been given had there been no restraint.
2.—Salary and increases are based on National Remuneration Scales³ which are rational and objective, and clearly determine work, pay and responsibility.