A TIMESHARING ENVIRONMENT

AN INDUSTRIAL REPORT

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Summary

Turner & Newall is a large orgainsation (known as the Asbestos 'giant'). It's history has spanned sixty years in which time it has grown from four medium sized companies into a Group concern operating worldwide.

Diversification and growth during this period has led to many reorganisations of the Group structure. The present day structure of the headquarters and five major divisions may change in time as a result of continued growth and changes in T&N Policy.

However the five divisions namely Plastics and Industrial Materials, Automotive Components, Chemicals, Construction and Insulation Materials and Asbestos Mining form the backbone on which T&N operates.

Headquarters at Manchester controls these operations to a certain extent but most important of all provides the necessary 'bureau' type services required within a large organisation.

However, detachment from the real problems of each individual unit company makes communication between them and headquarters an even bigger problem. T&N have tried in their structuring of the Group to overcome this problem. The three largest manufacturing divisions are each headed by a Chief Executive who is also a director of T&N. Since these divisional chiefs are also chairmen of individual companies, they have detailed knowledge and experience of the Groups worldwide opertions. This structure enables information and decisions to be acted on more quickly throughout the Group.

The services provided at headquarters supplements this process of communication of information and implementation of T&N policies. Each department at headquarters provides specialist services. Such services can be provided due to the size of the organisation; the 'best' personnel can be employed.

In particular the computer services provide users with the ability to send, analyse and receive data by a variety of methods.

One large computer service enables more control over the day to day data processing requirements within the Group. It also allows the larger applications to be developed for Group users.

The computer services are offered on a 'free' basis, although computing time is not. Costs for buying the computer and then operating it must be recovered so that future investment for a better service will be possible.

With the large number of users throughout the Group having different requirements, various systems have been bought or developed. The IBM 3033N (an 8 megabyte computer - the largest in the range) provides a service invaluable to the Group. The computer supports three systems TSO (Timesharing Option), IMS (Information Management System) and ROSCOE (an on-line program development facility).

All three are used extensively, so much so that the IBM 3033N is a new machine replacing an IBM 370 series (with attached processer) which became overloaded last year.

Timesharing, one of these three systems provided the basis for a years Industrial Training. As a real-time processing system it allows users to develop ideas as quickly as possible.

The timesharing team are specialists able and willing to help users in achieving the end product. Usually the applications developed are relatively small but are needed urgently. Within the Unit Company, services are provided to meet user requirements but frequently the timescales offered are too large for the user. This area is where timesharing comes into its own. It provides services on a day-to-day basis, to help train users, design, develop and implement systems and general problem solving.

Of course such a service must compete with outside services and so its costs are held as low as possible and promotion became important factors in its growth. Education is an important part of the service, courses being provided on DMARS, FCS and BASIC - Users are educated to use the service efficiently. If this can be achieved then costs can be kept below that of outside services, thus giving an invaluable service to users.

TURNER & NEWALL - THE HISTORY

T&N as it's so called, is a group of companies operating worldwide. The Group was formed in 1920 by the merger of four companies, namely Turner Brothers Asbestos Co., The Washington Chemical Co., Newalls Insulation Co. and J.W. Roberts.

The purpose of this amalgamation was to bring together the complementary activities of the four companies into an integrated unit with greater capital resources.

The objectives of the Group were 'to manufacture, deal in, erect and supply materials, substances and appliances for affording insulation or protection from heat, light, electricity, sound, blows, shocks, vibrations, air, water, fluids, gases, emanations and rays' as laid down in the original Memorandum of Association. The goods it was to produce were to be based mainly on Asbestos and allied materials.

These objectives still hold true today even though technological change and diversification of activities has moved the Group into new areas of production. Such areas have been Chemicals, Automotive Components and Plastics to name but a few. Movement into new areas has been a natural progression of the Groups activities and the growth of T&N has enabled it to become one of the worlds leading producers of asbestos-based materials.

The first Twenty Years (1920 - 1940)

From its early beginnings T&N has grown through acquisition, expansion and then reorganisation into a large integrated Group. The acquisition of companies has been a very selective process. The 'unit' companies are inter-related and provide complementary activities within each of the T&N divisions.

From the beginning diversification has played a key role in this process of evolution. Automotive Components was to be the first sign of this T&N 'policy' when Ferodo joined the Group in 1925.

With the advent of the motor car asbestos became an important friction material for brake linings. As T&N were already producing asbestos textiles this progression into friction materials was a logical step.

The Group also moved into the building and construction industry at this time with the reorganisation of their asbestos-cement interests. Concurrently, asbestos mines were acquired in Southern Rhodesia, South Africa and Canada, while manufacturing companies were established in India and the United States.

The formation of the Group had made possible a movement into the Automotive Industry through acquiring Ferodo but also to be able to look to the future. Turner Brothers were able to strengthen ties with two of their most important customers, Newalls Insulation and Ferodo.

J.W. Roberts and Newalls Insulation were able to expand with increased mechanisation in industry and insulation products were being more widely used to make life in the factories and outside more 'comfortable'. Noise had made sound insulation an important part in both companies expansion as did heat insulation later on.

Expansion abroad during the inter-war period became an important part of T&N's activities. The Group recognised the possibilities before them in the markets of the under-developed countries of the world, especially with construction materials. Thus one of the major moves was to establish overseas companies in such areas so as to provide cheaper materials and so exploit these markets.

Another major step was expansion through agents and associated companies of the Group. Ferodo were a forerunner in combining with companies abroad to gain better access to world markets.

The Next Twenty Years (1940 - 1960)

The War-Years enabled T&N to make important technological strides in reinforced plastics from a need for light but strong materials for aircraft components. Ferodo benefited by the demands made on them for automotive components in military vehicles. J.W. Roberts also gained through supplying insulation products for all forms of transport.

Peace and the reconstruction of war torn Britain gave T&N further chances to expand and continue development into plastics.

Fire-Resistant products, especially conveyor belting for the National Coal Board resulted in the development of PVC at Turner Brothers. Polytetraflourethylene was another plastic which T&N was able to use, this time for the Atomic Energy Authority in special valve seats.

During this period developments in other materials were taking place. Although plastics was a very important area a new generation of materials lead by glass fibre were beginning to threaten the traditional asbestos based materials. As a result the Group began development into these areas, glass fibre being the first 'new' material to be used in place of asbestos.

However, traditional activities were still of vital importance, this being substantiated by Turner Brothers expansion both at home and abroad.

(There was also a general programme of rationalisation to cope with these new development. Ferodo and Turner Brothers had been) continually expanding while J.W. Roberts was beginning to decline. This decline came about for various reasons. The expansion of the group meant that Turner Brothers could handle J.W. Roberts activities more economically since the factory of J.W. Roberts at Leeds could not be expanded along modern lines to cope with extra demand. Also a major buyer of J.W. Roberts' products, British Railways were discontinuing the use of steam locomotive and so such products as asbestos boiler mattresses were no longer needed.

Thus, J.W. Roberts were joined with Turner Brothers to expand activities in glass fibre, one of the Groups' youngest products. Further developments abroad however enabled T&N to maintain a very strong position with regards to asbestos fibre.

Mining operations worldwide were greatly extended. Canada, India and Africa were three areas where not only were mines acquired but also manufacturing plant were established by T&N. A policy of vertical integration was to become an important aspect of the Groups position in such areas of growth.

With such phenomenal growth over a quarter of a century T&N found that it needed a large headquarters centered in one of the major cities of the United Kingdom. Manchester was thought to be ideal since the greatest concentration of industry lay within a thirty mile radius of the city. Previously these headquarters had been based at Turner Brothers, Rochdale. Thus, T&N had evolved from four companies into an organisation operating worldwide and became known as the 'asbestos giant'. But this phase gave an indication of the T&N past not its future.

The Changing Years (1960 - 1980)

In the early sixties T&N began to create a broader industrial base so as to have greater flexibility in an increasingly competitive market situation. The products for the future would be made from materials other than asbestos - plastics and glass fibre being the base for such products.

In 1961 T&N indicated its future intentions by acquiring British Industrial Plastics one of the oldest and best-known companies in the United Kingdom. BIP were to form the base for research and investment into the field of plastics.

Turner Brothers (TBA) were also pushing forward with glass fibre products as now were J.W. Roberts and also Newalls Insulation.

There was a general change in the direction of the Groups activities and it was moving from a production-oriented to a market-oriented motivation. The time of asbestos based products alone was being replaced by an emphasis on making a product for the available market whatever the material composition of the product.

T&N reacted to the social change of the affluent sixties by expanding its automotive interest. In 1966 Engineering Components Ltd. were acquired, a group of companies producing gaskets, air cleaners and oil filters for both automotive and industrial purposes. Another area was also entered, that of cork materials by this acquisition (Cork Manufacturing Co.).

Although T&N were using more and more new materials, asbestos was still irreplaceable in many applications and it still had a vital role to play in the growth of the Group. In many cases throughout T&N, maintaining the flow of asbestos was a pre-requisite to keeping output and efficiency to a peak.

The problems in Rhodesia in the sixties and seventies effectively severed ties with mines owned by the Group. The extra costs involved in buying asbestos from outside the group was a serious blow. Thus, T&N investment in mining increased in the Bell mine in Canada. Further, investment in other areas such as the Cassiar Asbestos Corporation in 1968 subsequently lead to the opening of a new mine at Clinton Creek in Yukon Territory.

The task of keeping supplies of asbestos at a maximum and the communication and co-operation of the mines was controlled by a single department. Originally this department was based at Rochdale with the headquarters of the Group. However with the expansion of mining operations a separate company, Turners Asbestos Fibres Ltd. (TAF) was established. From this company more effective control of the mining activities could be realised and it has become an important part of the Group.

T&N's growth abroad took a new direction in this period, mining of course had dominated this expansion but other activities were to play their part. Most of the United Kingdom companies acquired businesses abroad notably Ferodo, BIP and EC Ltd.

Although European, American and Indian markets were still being infiltrated the African continent had not yet been exploited to the same extent due mainly to political and social considerations. However, with changing governments and states gaining their independence, foreign investment was sought after. T&N promptly acknowledged this need by expanding activities in Africa especially in building and construction materials. Although an area of great instability the markets of Africa had great potential for the Groups companies.

Unlike the African markets, those of Europe were very competitive, the EEC affording protection from most non-member products. This protection was in the form of tariff barriers which made outsiders products very uncompetitive in the European markets. This situation was not helped either by Britains failure to enter the EEC in the early sixties. However, Ferodo and many other British companies decided that the only way to infiltrate such markets was to establish factories in these EEC countries, so in 1964 Ferodo established an Italian company, Ferodo Italiana SpA in Northern Italy. Also in that year they set up a factory in South Africa to make brake linings, clutch facings and jointing materials.

The process of expansion through acquisition leads later to reorganisation, a general phenomenon caused by having an 'extra tier' of management. There was reorganisation in many areas for such reasons but also when vertical integration took place within the Group as when Bell mine was absorbed by the Atlas Asbestos Co. of Montreal.

In 1970 Turners Asbestos Cement Co. and J.W. Roberts merged to form TAC Construction Materials Ltd. The seventies was to be a period when T&N reorganised its Automotive Components interests due to a gradual expansion in this area. In 1980 final changes transformed the EC group into three separate operating divisons, namely Payen International, Coopers Filtration and Flexitallic Gaskets.

Also in the late seventies other changes were taking place. In 1977 Storey Brothers & Co., were acquired to strengthen the Plastics Division and a 52% share in Hunt Chemicals in the United States was purchased. This latter investment added a new dimension to T&N - chemicals. This link although relatively new, is compatible with the T&N philosophy.

The chemicals area is one of continual growth and change bringing forth new materials for T&N products and so help in the growth of the company. A new direction in materials, that of composites has been an area that T&N have acted on right from the beginning. In 1977 the future for T&N was again indicated by the setting up of the Alternative Materials and Fibres Unit (AMFU). Thus, research will be advanced beyond what each individual 'unit' company could achieve although the unit will also supplement what each unit company is working on.

The gradual change in T&N attitude towards non-asbestos based products has continued. However, such change has in recent years been hampered by problems in the economy both at home and abroad. Boom conditions ended in the mid-seventies and stagflation set in. With successive change of governments at home a new direction was taken, only to put the country into one of the worst recessions ever.

This has naturally affected all British Companies and many abroad due to world economies caught in the cycle. T&N has tried desperately to reorganise and ride out the storm. Fortunately, the industrial base of the Group is diverse and subsequently where some 'unit' companies have faltered others have survived.

The BIP companies were split into two divisions the PVC division at Aycliffe becoming known as BIP Vinyls. The EC group of companies was also split up at the same time. Storey Brothers were reorganised and Newalls at Washington were sold to Cape.

Mining interests in Canada were also sold but with relations with Zimbabwe being resumed the mines there were reopened. In any case, the mines in Zimbabwe produced better asbestos and the scale of operations were much larger than the mine sold.

Many other concerns were sold although none were very large. The Group were thus able to reduce their borrowings and thus interest paid although a great deal of the capital released was used in helping to maintain ongoing British businesses.

In the year to date the Group has managed to stabalise its activities although rumours of a takeover at one time threatened this stability. With greater rationalisation of processes and a slimming down the Group will be able to survive these difficult times and surge forward when the opportunity arises.

TURNER & NEWALL - The STRUCTURE

The Headquarters

Although T&N is the name commonly given to thé group of companies each 'unit' company regards itself as a separate partition, hence the term 'unit' company. Only those working at the headquarters in Manchester regard themselves as T&N personnel. As one of these T&N personnel this attitude is natural, especially when the diverse nature of the Group is taken into account.

T&N policy over a period of sixty years has seen an evolution which has resulted in five operating divisions being formed. However, control of 'unit' companies and subsequently each division has given rise to a heirarchy of management whose control function can be effective only if co-operation and communication are forthcoming.

These headquarters provide what can be called a 'bureau service'. Each department provides a service unequaled by any service provided within each 'unit' company. This type of service can only be possible if each department is staffed with 'expert' personnel who can effectively help in the control of each of the five divisions of the Group. Each unit company is able, through the headquarters to obtain the best possible help in almost all matters from legal to computing problems.

The departments are as follows:-

1. Secretarial
2. Legal
3. Personnel
4. Accounting
5. Public Relations
6. Treasury
7. Pensions and Executive Services
8. Corporate Audit
9. Corporate Planning
10. USA Chemical Co-ordination
11. Environment
12. Medical Services
13. Asbestos Fibre Laboratory
14. Alternative Materials and Fibres Unit
15. Computer Centre

The last of these departments will be the topic for discussion in later sections.

The Five Divisions

Control of such a large organisation must be by discrete units if it is to be effective. Thus, T&N has evolved a structure with distinct divisions, five in all.

These and the major UK companies under each division are as follows:-

1. Plastics and Industrial Materials

   (i) British Industrial Plastics (BIP)
   (ii) Storey Brothers & Co.
   (iii) Turner Brothers Asbestos Industrial Products (TBA)

2. Automotive Components

   (i) Payen International
   (ii) Coopers Filters
   (iii) Flexitallic Gaskets
   (iv) Ferodo

3. Chemicals

   (i) Hunt Chemicals

4. Construction and Insulation Materials

   (i) TAC Construction Materials

5. Asbestos Mining

   (i) TAF (Selling and Buying at Headquarters)

TURNER & NEWALL - COMPUTING

Progress

T&N like many large organisations rely heavily on the computer and all its applications in modern industry. The general policy of T&N is towards change and diversification to help in the growth of the Group. Computing has an ever increasingly important role to play in this future.

Computing was one of the areas T&N had to incorporate within its activities to be able to cope with the demands of data processing, ever increasing in quantity and complexity.

One of the problems facing T&N is that when it acquires new businesses of a moderate size such businesses almost invariably use either a bureau or their own computing services. Thus, one policy of T&N was to have moderate sized computers situated at each of the larger 'unit' companies. However, this has inherent problems in control of such computing services.

Firstly, if computers are acquired from different manufacturers then usually communication between one computer and another is frequently an expensive affair if at all possible! Secondly, each company becomes self reliant. But the cost of equipment and maintenance plus the cost of staff to operate a computer may become so great that it is cheaper to use a bureau service. With political considerations also playing a part in such decisions it was thought wiser after some initial centralisation by unit companies, to establish one central computer at the Manchester Headquarters.

A central computer for the whole group has many cost advantages over separate computers plus it gives the greatest possible control over the use of services. Thus, efficiency and effectiveness can be attained which were not normally possible with a decentralised computer service.

Computing Services

The computing department is divided into two distinct units, operations and support.

The computer at present is an IBM 3033N, with other services provided via a mini-computer at the Computing Centre and various smaller units throughout the Group. However, the IBM 3033N forms the base for the T&N Computing Services.

The operation of the computer has of course its own technical staff who also provide support on communications for the telex, telephone and word processing services.

The support given to computer operations and users is essentially provided by two departments, the Technical Services and the User Services Departments. The Technical Services Department provides system software support and maintain the software which runs on the computer. They help in the 'tuning' of the computer as well as developing new systems software, not supplied by IBM. Indeed they also debug IBM software which does not work satisfactorily on the computer.

The User Services Department provide the User support to the 'unit' companies. They provide help in feasibility and design of applications and either help in or do the programming necessary depending on the requirements of the User.

Within the User Services Department are two separate units the Applications side of software and the Timesharing side.

The Industrial training period was spent in the latter of these areas but since the boundaries are not clearly defined what was a Timesharing system could become an Applications type of system.

Computing Department - Timesharing

What is Timesharing?

Timesharing as it's so called is one of the more recent developments at T&N if not new in computing terms. The timesharing service was first established in 1979 when the computer was then an IBM 370 with 158 attached processors.

The word timesharing comes from the idea that users can effectively share the computer resources concurrently. However, due to the speed of the computer it is able to allocate a time slot to each user in turn and perform a task for the user and then repeat the process again.

The IBM supplied software which gives Timesharing service is called Timesharing Option (TSO).

The user can run programs interactively on the computer as well as via batch processing. This type of service allows greater flexibility when developing applications and usually the time taken to develop an application is shorter than with other data processing methods.

Another aspect of the service are its packages which enable the non-programmer to be able to design and implement their own applications with relative ease. Thus, many users had little computing experience before making use of the service.

The essence of timesharing is in the processing of small volumes of data very quickly and with relative ease. It is useful in 'modelling' where answers to 'what if' questions are required, or where changes to the system are frequent and these changes are easily incorporated through the service. It is also useful when the particular application is too small to be economical if developed by a traditional computing method.

This type of computing allows the end-user to develop the system with the aid of timesharing and also enables the user to learn more about the problem in hand and how the computer works concurrently.

My Role Within Timesharing

The staff in the timesharing department provide a comprehensive service to the end user. The role as Timesharing Assitant is not really very different than that of the other staff (3 people). However, due to the period of employment training given is based on what work is available at the time. Fortunately the type of projects I was involved in were varied in nature and in what was achieved.

The type of work can be categorised into three areas - training, system design and implementation, and problem solving and general advice.

Training

Training is a very important part of the timesharing service. If systems are to be run by someone not familiar with computers, as is the general case, then they must be given the necessary training. In some cases the intended user of a system already runs the system manually and the translation to a computer system is what is required.

Thus, he/she needs to be trained either to use a system developed by timesharing or trained to actually develop the system with necessary aid from the department.

Training takes place on-site or if this is not possible or indeed desirable then at the centre. Courses are given in the Basic programming language and the two TSO developed packages, DMARS (Data Manipulation and Reporting System) and FCS (Financial Corporate Planning System). The department also advises on external courses and give personal training when a system is being developed.

Various documents are also produced by the department to aid the process of training. During the year in industry I have contributed to a minor degree but have been deeply involved in giving courses (DMARS). I have also helped on a BASIC course and written a short explanation on 'What is a Computer' for a lecture which was later given! Subsequently this article was incorporated into a one-day course on the computer and timesharing in general.

However, the most important documents I have produced were the documentation for a BASIC system I developed (explained later). This area of computing is usually forgotten or ignored because of the effort involved. However, with a system written in BASIC documentation for future maintenance and operation of a system is vital. This was especially true as I was employed for a short period and was effectively the only person with adequate knowledge to maintain such a system without documentation.

Thus, the training aspect of the work is not only useful in that end users gain experience necessary to use the computer but also it releases timesharing from just training people to actually developing important systems.

System Design and Implementation

Systems design is probably the most important area in computing from a timesharing point of view. If users once trained were left to their own designs then invariably they would not approach the problem in the best way. This would not be because they lacked initiative or the training given was inadequate but purely due to the bewildering methods that can be used to solve a computing problem.

Is timesharing the best way to proceed in some cases, stops the proposed 'timesharing' application from ever leaving the drawing board. However, in most cases the suggestion to use timesharing was made with insight into the problem and the knowledge that other methods were not available. Frequently, timesharing is the only economical way of proceeding since the project is not large or important enough to warrant the use of other methods.

The choice of language or package is frequently an important consideration and combined with the approach taken in the initial stages can be a deciding factor in the success of a project. For this and other political reasons timesharing likes to be consulted in projects under development using this service. This initial consultation will not only benefit the user but will also help timesharing in being able to advise at later stages.

Of course help obtained through timesharing will help reduce effort in developing the system and can also improve the efficiency of the system.

Problem Solving and General Advice

The use of timesharing as with any other service will invariably lead to problems at times which cannot be solved without expert help.

Many phone calls are received each day which concern problems met when using the service, or general queries such as 'when is the next DMARS course'. Most of these problems can be solved over the telephone but on some occassions 'logging on' to the user identity and sorting them out directly is the only solution.

Visits are also quite important when more broader and complicated assistance is needed. Either the timesharing staff travel to the site or the user comes to Head Office to talk over their problems or to find out about some aspect of the service.

The team spend a great deal of their time travelling to different sites to give such advise and also when developing systems.

Thus, the support team try to give the best possible service to users. Their task is to help the user to get the best out of the service and their objectives are to make this use as simple and effective as possible. The courses given are usually two days of intensive lectures (4 in all) and practical sessions (4 in all).

Timesharing - Its Application

A year at Turner & Newall, under the Timesharing umbrella has provided invaluable experience for the future.

Projects have been and will always be an important part of the timesharing service. The packages and languages provided give scope for development of applications, DMARS (Data Manipulation and Reporting System) a T&N product, showing the extent to which Timesharing provide such scope.

However, when confronted with a problem a feasibility study must decide whether a computer system is necessary in the first place. Secondly, in making this decision the type of system to use must be decided. Timesharing is an obvious choice where time is the important factor and the application is of a 'timesharing type'. Factors which contribute to the 'type' are cost, timescales, size and type of operation. Once these factors have been satisfied the choice of language or package must be made. Flexibility versus 'ease' of operation can decide this point.

Education can play a part in deciding what language or package to use. If a package is to be used then Timesharing offer extensive courses on FCS and DMARS. BASIC is the language taught but the expertise required when using a language may prevent some applications being developed by the user. Support by timesharing becomes an important part of the service.

When designing a project many considerations on future developments must be made. The development and implemenation may require timesharing help but what happens once the system is in operation? Maintenance thus becomes an important consideration, will the data processing department at the user site maintain the system or will it be timesharing?

Costs at present are vital but even in better times Timesharing pricing policy may force some systems to be scrapped. Only the most cost effective or vital to company operation, systems will survive. Most projects though never reach this stage unless such circumstances within the unit company change to force such a situation.

At Turner Brothers Asbestos (Hindley Green) a project to help in the control of waste material was developed but due to factory reorganisation may be scrapped or at least redesigned to take in the changes. Some systems are conversions from clerical to the computer and subsequently, even if not cost effective may be kept since replacement would mean a reorganisation. However, foresight on the part on the user and to some degree the timesharing department can prevent such situations arising. Awareness is thus an important aspect in computer systems design whether it be to possible changes in the future of the type of application required.

PROJECTS - THE SYSTEMS DESIGNED AND IMPLEMENTED

In just over a year the projects I have been involved in have been extensive. An important aspect of the training from a personal viewpoint was the discovery of APL (A Programming Language) and its use in writing the DMARS package. It shows the extent to which a very interesting but seemingly complicated language can be used to write a simple but very powerful package.

Before discussing the projects worked on it would be useful to explain briefly what DMARS as well as FCS can be used for.

DMARS (Data Manipulation and Reporting System)

A package written by R. Fidler (Timesharing Manager) based loosely on other packages available but more robust and production-oriented. The package allows the user to easily set up data in the form of columns and rows. He can then analyse the data with a variety of commands, allowing calculation, sorting, listing, printing and selecting. One of its more powerful features is being able to compare two such data sets and either update or merge one with another.

FCS (Financial Corporate Planning System)

A financial package as indicated by its name, it allows the user to set up a model as in DMARS but provide much more extensive down calculations (by row). However, the package does have disadvantages such as the complicated methods in setting up the data. These are easily mastered with a little practice. DMARS has a much easier way of data entry but lacks the ability to set up data for consolidation. This is one of the best features of FCS and is very useful in the accountancy field.

BASIC, FORTRAN, APL & COBOL - Programming Languages

A few of the major languages are provided on the IBM 3033N. APL and BASIC being those used extensively by timesharing. However, APL is not user oriented and due to the nature of the character set is not available at most sites. The character set demands a special keyboard and so DMARS has been designed so that these characters are not needed. Thus users can use an APL package easily without knowing anything of the language controlling it.

BASIC however is widely used since it is quite a simple language to teach the non-computer oriented person. It is a very flexible language and is ideal for systems whereby changes needs to be incorporated quickly.

One-Off Programs

Within timesharing small program problems arise from time to time. These one-off situations need a quick solution or usually need to fit into the system already in operation.

To cater for such situations available staff are given these programs to write. An interesting problem set was to write a COBOL program to analyse and print out control information and sales figures in a summary form. However, due to the intricate nature of setting up JCL, (Job Central Language) on the IBM (seemingly complicated software) this task took longer than anticipated. The flexibility provided by such software greatly outways any disadvantages such as its complexity. Thus, the general user rarely uses such software and its use though widespread is invariably the task of the programmer.

T&N have developed many applications for Group use with the aim of standardising and having more effective control over the type of computer systems established for unit companies.

One such system which is available to users is the Pensions package, a series on interrelated BASIC programs. I provided a little help in the writing of two such programs both fairly simple but this task enabled me to grasp the workings of VSBASIC on the IBM machine.

One of the methods within timesharing in training is to give the programmer a task to tackle and then to give him or her a little help in coding the program. However, the major part of the work is left to the student so that as much experience as possible is gained in writing the program virtually from scratch.

Such an attitude was adopted although in a slightly different vein with a stock transfer program I was given to write. However, the structure and flow of the intended program had already been sorted out and then handed down. This was to enable me to grasp the use of VSAM files (Virtual Storage Access Method) which were to play an important part in a later system. This particular program was to transfer data from a file held under TSO into smaller files depending on certain conditions prevalent in the original file. At a later stage this data was to be transferred into DMARS for use in a system. This system was later developed by other members of the timesharing staff and the BASIC program was extended.

Fortunately training in BASIC was not necessary from scratch, only a revision of past learning. However, it was my wish that I had some training in APL. This would enable me to have an insight into the workings of the DMARS package. Due to the present economic situation T&N could not afford to send me on an APL course (especially since I was a student employed for only

one year). However, personal training given by two members of timesharing helped in giving me an understanding of the complexities of APL and how it was used to great effect in writing DMARS. This training was invaluable since it will give me an extra opening into the ever expanding world of programming.

The Five Major Projects

During the year I have worked on five projects which have required a high degree of involvement from myself and to a lesser degree other members of the timesharing staff. These are as follows:-

1. Card Index System for Market Research Journals (TBA - Rochdale) - DMARS system

2. Project Control - an internal project (Computing Centre - Manchester) - DMARS system

3. Material Control - (TBA - Hindley Green) - DMARS system

4. 'Green' Machining (Ferodo - Chapel-en-le-Frith) - DMARS system

5. Raw Material Requirements Planning (BIP - Aycliffe) - BASIC system

The success of each system has been hampered greatly by the present economic situation and also the costs in running such systems. Unfortunately the timesharing service cannot offer a 'free' service (computing time) but does offer a service which is cheaper than any outside bureau. The pricing policy of the timesharing department generally is there to encourage more efficient use of computer resources and more thorough analysis when designing systems. It is also very important in allowing only the most cost effective projects to reach the development and implementation stages.

From an operating viewpoint the timesharing pricing policy greatly favours batch processing although ironically timesharing was set up to allow interactive processing. Of course once a system has been fully developed it is logical to try and use batch processing as much as possible to reduce costs and this attitude is what timesharing hopes to encourage.

Card Index System (TBA - Rochdale)

A system forced upon the user when the economic situation deteriorated timesharing were asked if they could help. The first stage in the process of evaluation and design of such a system was to visit the site and meet the people involved.

Since this system was already widely used but on a manual basis rather than on a computer we looked at the feasibility of such a project and whether a computer system was the correct approach.

The clerical system was based in the market research department and due to staff redundancies it was impossible to continue in its present guise. Timesharing were 'called in' to see if the computer could offer a timesaving alternative now that the department had been slimmed down (effectively meant one man was doing the work of four).

After all possibilities were discussed a solution was found using DMARS. The system was to be similar to the original clerical method of locating journals via a card index system but naturally much faster.

Unfortunately the frequency with which the system was to be used later on was to be so small that the computer method was not cost effective. Subsequently, the user decided to revert back to a card index system but in a much simpler format than previously. Single line entries were made from the journals and provided enough information for the user to be able to find the appropriate journal and the topic required.

This type of system it was later discovered was available via a bureau service which had become cheaper with the use of the telephone system. Thus, the company concerned have now found that the computer based system is useful as a backup system with the majority of journals being easily found via the single entry card index system.

Project Control (Computing Centre - Manchester)

With ever increasing demand for computer services, the department must be more selective in the projects it undertakes. Control of the projects the computing department becomes involved in is a very important area when limited resources are available. When such resources have to be spread between different unit companies this control is especially important if each company expects equal support.

Thus a internal reporting facility on the projects undertaken by both Technical and User Services can be of great value. Analysis of such a report can indicate growth areas within the group, show where allocation of resources is best placed and allow management to have an effective tool for this allocation.

The project entailed each member of the department filling in a form each day for a week. This form would then be processed by entering the data via DMARS into the computer and accumulating the time spent against projects for each person.

At the end of each month three reports are given showing project involvement by unit company, by project and by personnel. These reports thus provide an account of the work undertaken by the computing department in terms of support to 'unit' companies as well as internal support. They also provide an essential tool for future decision making on the way the department intends to undertake its commitments within the group.

This particular project has been very successful because of its importance to the effective control of other projects. It also is an internal cost and therefore if a 'reasonable' one will not be looked upon as would a unit company project. The service in effect provides an internal service which is 'free' in that the cost is artificial although obviously book entries take place to account for the cost.

Material Control - (TBA - Hindley Green)

An example of the type of documentation provided by the timesharing service (Appendices) shows exactly what this particular project entailed.

At Hindley Green and in particular the Belting Division waste control has a major contribution to make in helping to cut costs. Unfortunately, the process in making belting, lead to a great deal of waste material. Mostly, rubber which can be recyclyed but a significant proportion is expensive cord and fabric. Also the recycled rubber loses value and must be used as a second grade material when originally it would have been a top-grade.

The project lasted for about nine months during which time many changes at the factory took place, some as a result of the project. People became aware that they were being monitored and subsequently contributed in the material control process.

Although development of the project was the reason for on-site work at Hindley Green other user support was very common. Frequentyly the timesharing staff when visiting a site 'share' their time between users to give maximum benefit to the company concerned.

The project at Hindley Green had many stumbling blocks which were negotiated successfully, if not quickly and with care. Notably was the use of 'standard' lengths and weights assigned to belts for costing purposes. These standards were relied upon heavily even if at times information given seemed inadequate or incorrect. Many of the problems associated with finding such

'standards' and checking them brought about a feeling of mistrust towards the costing department although they tried their best to give the most accurate measurements.

Subsequently, the system was developed to a stage where the computer results were trusted more than the costing departments results even though both the clerical accounting system and the computer system used the same 'standards'.

Unfortunately due to reorganisation of the factory the user who helped in the system development is being made redundant and this effectively puts the future of the system in jeopardy. However, once reorganisation is complete the system may find itself being controlled by a new user.

Green Machining (Ferodo - Chapel)

Involvement in this particular project gave insight into the workings of a very important company in the T&N group.

The concept of green machining was to produce brake linings to finished dimensions whilst the material was still uncured. This meant that waste was reclaimable and the process envisaged would be more efficient and be able to handle larger volumes of product quickly.

The problem that the support team (myself and the timesharing manager - then timesharing consultant) was how to interrelate the envisaged computer system with the planning system already in use on the computer.

The green machining area could not be incorporated in this normal planning system because it was designed as a separate manufacturing unit.

To optimise the green machining technique all similar dimensioned products were grouped together, matched against tooling requirements and then sequentially loaded.

This selected load must then be deleted from the normal planning systems factory load for production using green machining. DMARS was the ideal choice for this process of selecting, sorting and then matching and printing the necessary loading.

Involvement was necessary from timesharing from the beginning of such a complicated but vital system. The future of production using this new technique at Ferodo meant that the system needed to be planned step by step as carefully as possible.

From the initial stages, the personnel involved were given training in DMARS and the system was designed at Ferodo with assistance and guidance from timesharing. The object in this particular case was to allow the users to develop the system since, the background knowledge of green machining and factory loading was no simple process to learn. Also if the user developed the system it would be seen as a Ferodo development rather than a timesharing one, which it was in its initial conception.

Raw Material Requirements Planning (BIP - Aycliffe)

Raw Material Requirements Planning was probably the most interesting of the projects undertaken. A complete rewrite of an existing system in BASIC using VSAM files was thought the best approach. Originally the system was designed and implemented for a clerical system to the computer. It used OS files (on-stream) data but because of the type of analysis intended on the data involved random processing of records these files were soon found to be cumbersom to handle.

On contacting Timesharing for assistance in extending the old system it was thought better to not only enhance but also rewrite the old system. The type of access needed on the data had resulted in a very inefficient method to be developed over the years.

After consultation with the staff involved I was called in to help in analysing and if necessary redesigning the system with the intention of improvement and enhancement. A total rewrite was obviously needed and this meant a lengthy project. However, the resultant system would be more robust, easier to use and more efficient.

Control of costs in designing such a system was important and also timescales. Once these had been sorted out and the go ahead was given the project went into full swing. The whole purpose of the system was to analyse planned production and produce from stock figures the forward stock position of the raw materials used in this production. BASIC was chosen since the old system was already written in the language and the personnel involved had years of experience in running the old system using this language.

My initial thoughts were to develop this particular project using DMARS rather than BASIC. DMARS although not a flexible as BASIC would have provided a much simpler and speedier development and would have been more cost effective during design and development. However, due to the considerations already explained, these thoughts were not a sound proposition at this particular time.

The system was subsequently designed and developed resulting in implementation over a period of about five months. The number of programs in the 'new' system, twenty five indicates the size of such a system.

Documentation was a vital part of the system, an Operating Manual, Program Documentation and Systems Flowcharts were essential. This was especially true since the final result would have to be maintained by the other timesharing staff as well as the staff at BIP who were involved.

Conclusions

T&N

The idea which gave birth to T&N was conceived in Rochdale sixty years ago. Asbestos was its basis. Today, T&N's role is to provide a wide range of materials which, like asbestos, provide safety, comfort and protection.

In the science and technology of composite materials T&N is a world leader. In this field, the Group has production skills and marketing expertise which few can emulate and which provide a guarantee of future growth.

Times change and industry must change with them, adapting itself to new ideas in technology, new concepts of management and new opportunities in world markets.

Recent times have affected the whole of British industry, T&N being no exception but the storm has been weathered well with few victims. The future thus provides T&N with opportunities which they will take and turn to suit there needs in the quest for growth.

TIMESHARING

Timesharing is an effective way to allocate computer resources to those requiring them. It is an indication as to what is to come in the future. With ever increasing use of the computer by the non-programmer timesharing services will become an important part of everyday life for the masses.

Television has influenced these type of services by the introduction of Oracle and Ceefax, systems which allow the viewer to look into a database containing a variety of useful information. The micro-computer has allowed the home-user to experience the computer from a programmer viewpoint. These two developments show the extent to which the ordinary person can communicate with a computer. Future developments will allow such users to communicate with each other via the Post Office or some other organisation. Subsequently, timesharing will become an even more important part of computer life.

Within T&N the service is already training the non-computer user to such a degree that these people will be able to use the computer easily and efficiently.

High-level languages have lead to packages which in turn may lead to complete systems whereby the user can easily communicate with the computer without needing a great deal of training. Oracle and Ceefax are very simple systems to use, perhaps one day timesharing will be as simple.

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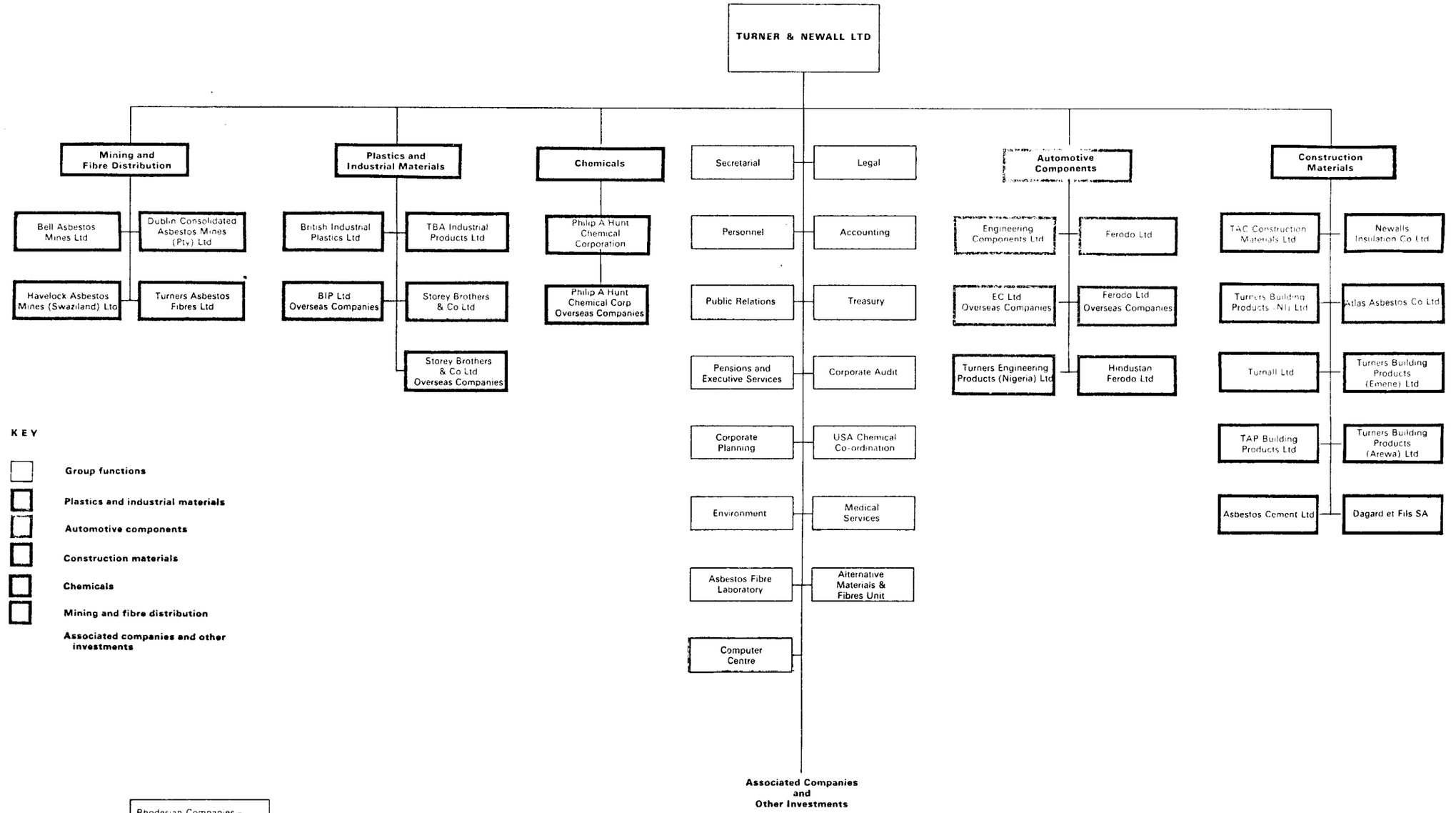
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Turners Building Products (Emene) Ltd
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Rhodesian Companies –
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WHAT IS A COMPUTER?

There are three main units of a computer:-

1. The Central Processing Unit (CPU for short). This is the 'brain' of the computer which, under the instructions of the ocmputer program, co-ordinates and controls the activities of the other units. It performs all the arithmetic and logic processes applied to the raw data stored in the memory (core).

2. Storage Devices (Core [RAM], Disc or Tape). Such devices enable storage of raw data and the instructions forming a program which process this data.

3. Input and Output Devices (Peripherals). These devices allow information to be entered into/retrieved from the computer. Input is via a keyboard type terminal. Output is usually via printer or sometimes by screen.

In the past few years, all these ingredients of computers have been improved drastically. There have been changes in all directions:- reductions in size and cost and at the same time increases in performance and reliability. In fact computer power is increasing almost annually by factors of 2!

However computers can only do what they are instructed to do.

Programmers in particular are the most aware that computers are no substitute of the human brain. In fact the preparation of work to be run on a computer is one of the most mind-mending exercises likely to be encountered in everyday life. No doubt in time, as the computer becomes more a daily fact of life, the individualistic computer experts will emerge from their shells to embroil us all in the workings of their interesting machines.

The Office Clerk Analogy

The computer is a very simple machine whose main advantage is speed. How then can such a machine produce, with unfailing accuracy, the wage-slips of a large factory payroll each week? The computer does not use any new methods for producing payrolls but it will beat the human wage clerk every time by virtue of its speed and accuracy.

In order therefore to discover the constituent parts of a computer system and the way in which they are used to solve an everyday problem let us first look at the methods used by its human counterpart.

1. In-Tray

The in-tray will contain all incoming information which may affect an employee's wage-slip. It will contain such items as clock cards, sick notes, grade changes and bonus payments.

2. Files

These will contain current information on each employee which will provide the base upon which the wage-slip is made out. The file will also contain items to be accumulated on week by week such as tax to date and gross pay to date.

3. Memory

As each new wage-slip is produced, the clerk will read from the files and in-tray items, information relevant at the time. This information he will then hold in his memory where he can refer to it at any time.

4. Calculator

The clerk will use some form of desk-calculator, as well as his brain, and perhaps a scrap pad to perform the necessary calculations to produce the totals on the wage-slip. This will involve processing information from the file and in-tray as well as from memory.

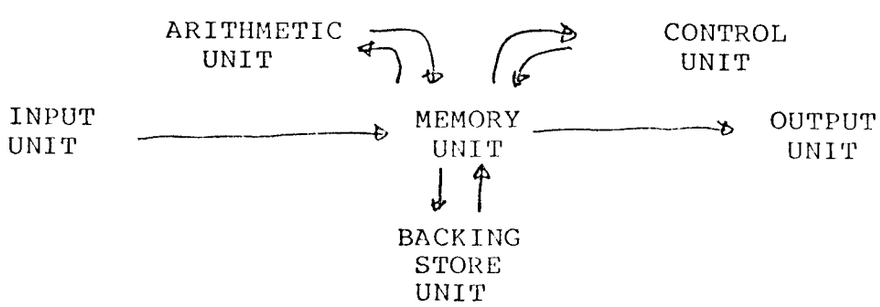
5. Out-Tray

Once the clerk has calculated and entered the various details on to the wage-slip and pay-sheet, and up-dated the file he passes the information on to either the employee or another department. To do this he will put the information into his out-tray from where it is distributed as required.

6. Procedure Manual

Each step taken by the clerk in producing a wage-slip will be set out in a procedure manual to which the clerk can refer to at will. This manual must also contain procedures to follow in unusual circumstances.

The computer system performing an identical payroll job would required basically the same six functional units as the wages clerk and would operate in the same manner. The corresponding units of the computer system can therefore be shown diagrammitically:-



THE COMPUTER UNITS

Input Unit

In order for the computer system to process details of each employees weekly pay variations these will be converted into a machine-readable format and passed through an input device.

Backing Store

The file on each employee holding all relevant information will be held on some form of backing store. When the computer reads in each employee's details from the input device it will request the backing store to provide the file record. After the calculations are performed the file will be updated by returning the record to its place on the backing store.

Memory Unit

The data read from an input device or backing store are transmitted to the computer memory unit where they are available for processing. This processing can consist of arithmetic computations (for example, subtracting the employees deductions from his gross pay to produce his net weekly wage) or logical operations such as examining the employees staff-grade to determine his bonus or overtime rate. The data in the memory unit are also available for transmission to output devices.

Output Unit

When the details of an employees pay-slip have been computed they must be made available in a human readable form. This is the function of an output device which transmits data held in memory to an external medium.

Program

The set of instructions (called a program) corresponding to the clerks procedure manual, tells the computer how each step in the production of the pay-slip is to be carried out. The program is held in a reserved part of the computer memory and is activated by the Control Unit. Each instruction is selected (one at a time) and decoded by the control unit which will instruct which of the other units is required to perform a particular function.

Data flows from the input unit to the memory unit where they are held, until with data read from backing store, they are transmitted to the arithmetic unit for computation before being transmitted to the output unit.

The arithmetic, memory and control units are collectively known as the Central Processing Unit (C.P.U.).

THE OPERATING SYSTEM

An operating system is designed so as to schedule its jobs in an orderly and efficient manner. The Central Processing Unit operates at a much faster rate than the hardware (input and output units).

Since most data for the computer is held on dics files access to this data is mcuh slower than the rate at which the CPU operates.

If the computer works on a single program than the CPU will be totally underutilised. Thus, in the early 1960's a solution was found to the problem of underutilisation of computer resources. The idea was to run several programs at the same time. When two programs were running together, one waits for the other. As an example, when one is waiting for disc data to be recovered, the other uses the CPU to calculate.

Thus a system which controls the running of programs is known as the Operating System.

Timesharing is a logical extension of this sytem allowing many users to run programs "concurrently". The computer works so fast that each user gets the feel that he is getting the full attention from the computer.

To keep the computer running efficiently and effectively "systems programmers" look into and improve where possible the operating system. They add to the system as well as improving it giving extra facilities to the users such as printing locally.

Running a Program

To do a job on the computer it must be able to understand the instructions given to it.

Such instructions are written as a program. For the computer an instruction is a series of 0's and 1's, not practical instructions for a programmer to write. Thus languages have been developed to translate a job into an easily written program.

The languages are English type instructions which computers translate into machine executable code.

The process of changing a high-level language such as BASIC into machine code instructions is called 'Compiling'. An extension to this is DMARS which is written in APL. First it is interpreted (translated), then is executed directly.

COMPUTER PERSONNEL

Operators:-	These people look after the physical operation of the computer. They start it up each day, load tapes, schedule jobs etc.
Network Operators:-	They look after the telecommunications network such as the modems telephone" lines and terminals.
Systems Programmers:-	They maintain the operating system, 'turning' the system programs to improve machine utilisation and add new facilities when necessary.
Programmers:-	A programmer writes programs for commercial systems and makes them work.
Systems Analysts:-	They study business problems and interpret them into a computer system which works, specifying what has to be written by the programmer.

By making the use of the computer more simple, timesharing users are able to tackle the last two tasks themselves.

"OUR" COMPUTER

CPU

The new computer, the 3033N [IBM] will handle 3.5 million instructions per second.

"CORE" OR RAM

The size of the memory ("CORE") is 8 million bytes (Megabytes).

One byte is equal to 8 bits

e.g. 10010011

Typically, a byte represents a single character of data.

Other Storage Devices

We have 36 discs each carrying 317 Megabytes and 4 tape units (with hundreds of tapes of approximately 200 Megabytes each).

Peripherals - Input/Output

We have 2 system line printers, approximately 20 RJE (Remote Job Entry) terminals with line printers, card, disc storage and tape facilities, 300 VDU (Visual Display Unit) terminals and 6 Hard Copy terminals (3767's).

COMPANY:- TBA - Belting Division - Hindley Green

PROJECT:- Material Control

The Belting Division of TBA are making extensive use of the DMARS package in order to improve the control of material usage on the shop floor.

Manual systems existed for some area of the factory - these essentially reported on material usage by product group, and by process, on a weekly basis. This 'two-way' view of material usage was found valuable in pin-pointing areas of wastage, and the first objective was to reproduce this system using Timesharing. However, production management felt that the involvement of such a system was essential, and thus personnel of these production areas were trained in the use of DMARS.

Following the successful completion of this relatively simple 'computerisation' task, steps were made to develop a similar though necessarily more complex, system to control Drive Belts material utilization (V Belt, Poly V Belts, and raw edge). Here again, the two way view of control information- by product and by process - was to be retained; but no manual systems were in existence.

Reports are now produced detailing the "Theoretical" or standard usage of materials expected for the achieved production. This can be compared with actual usages in order to highlight problem areas.

Clearly, the system is strongly dependent on the relevance of the 'standards' information, and in the course of operating the system, information will be produced which will enable revision and refinement of these standards. This process will be made more meaningful owing to the heavy involvement of all supervisory levels.