

RANK XEROX

Mitcheldean
21ST ANNIVERSARY



1959
1960
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980

Mitcheldean 21ST ANNIVERSARY

This year Mitcheldean celebrates the twenty-first anniversary of the start of a revolution – a revolution in business communications which in two decades has spread world wide.

It was sparked by the commencement in November, 1959, by a small but expert team working in what was called the Woodshop at Mitcheldean, of the first xerographic or dry copying machine ever made in Britain, the Xerox 914, so called because it took paper up to 9 x 14ins in size.

By today's high technological standards it was not a very remarkable machine, doing six copies a minute. But it proved to be very efficient and durable – many are still in use today – and was followed by others that were progressively better.

Few of the people who helped to make the first 914 realised then its revolutionary potential. But realisation came quickly, with the most extraordinary explosion of demand for these pioneer office copiers and their successors.

In the relatively short space of 21 years it transformed Mitcheldean, originally a small manufacturing unit established in an old brewery, into a vast 67-acre complex employing more than 4,000 people. Some are newcomers, but many are veterans who in the last 21 years have made a substantial contribution to the growth of the £1,165m Rank Xerox turnover, with profits before tax of £255m and supplying more than 80 countries.

The story of Mitcheldean's beginning, the events of 1960 and the exciting 20 years that followed is told in the following pages.



In the beginning

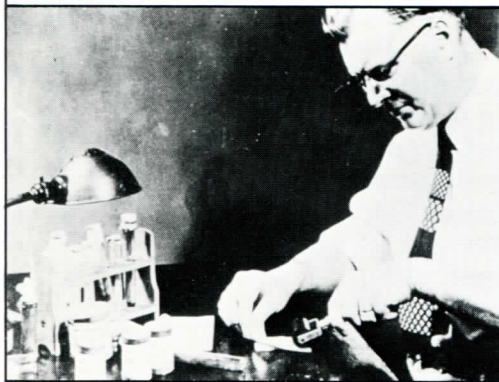
The revolution in office communications that began in 1959 had its origin in the two preceding decades. There are two strands running through the historical record, converging at Mitcheldean.

The first strand goes back over 40 years to the inventor of xerography, which is derived from Greek words meaning "dry writing."

He was the late Chester Carlson, an American who in the 1930's worked in the patents department of a New York manufacturing company. He often needed a dozen or more copies of a patent specification, and they had to be laboriously produced on a typewriter using carbons. The only photo-copying machine then available required a dark room installation.

Carlson dreamed of a small desk-top machine that would produce copies at the press of a button. His early efforts to produce such a machine were unsuccessful, but in 1938, with help from a physicist, he established a process that gave a copy without using wet chemicals or a dark room.

His attempts to interest manufacturers in the machine were interrupted by World War II, during which he met an engineer at a research organisation, the Batelle Memorial Institute in Columbus, Ohio, where further research led to improvements on his own early results.



The famous picture of Chester Carlson at work in his Laboratory.

10.-22.-28
ASTORIA

First Xerographic print made by Chester F. Carlson on October 22, 1938 in Astoria, New York. The characters are dyed lycopodium powder affixed to waxed paper. The process was then called "Electrophotography" by the inventor.

It was not until after the war, in January, 1947, that the big breakthrough came when the small Haloid Company, of Rochester, N.Y., took out the first licence and sponsored the development of the dry copier.

Haloid (which became Xerox Corporation) was founded by a far sighted American, Joe C. Wilson, who put his own savings, and urged friends and shopfloor workers to do the same, into financing a development in which he had implicit faith. Never had faith been more justified for a few years later Joe Wilson and John (now Sir John) Davis, chief executive of The Rank Organisation, signed an agreement to form Rank Xerox. They became partners in one of the world's most successful businesses.

At much the same time as these events took place in America, the second strand of the story was unfolding at Mitcheldean. This began with the British Acoustic Film Company, makers of cine equipment, with premises at Shepherds Bush, London. In wartime they had turned to production of searchlight equipment, gunfire direction tables, 16mm projectors for Forces education and entertainment, and a portable 35mm projector made to Admiralty specifications, one of which was installed in the Queen Mary.

It was national policy to move key firms out of London during the blitz, and British Acoustic Films was officially urged to move to one of two places. One suggested site, at Poole, in Dorset, was bombed, with the result that one fine day in the summer of 1940 the late Tommy Law and his BAF co-directors drove into the ancient village of Mitcheldean and parked on the roadside to eat a sandwich lunch.

They had gone to inspect Francis Wintle's Forest Brewery, which had once brewed beer for the Foresters. Following a takeover by one of the major brewers, two of the old buildings were vacant. The third, known as the maltings, was still in use producing vitamin pills.

Doubtless with some misgivings, the BAF directors decided to set up their factory. The

main brewery building became the base around which grew the vast complex that has put Mitcheldean on the industrial map of Britain.

The original site covered only a few acres, with the gasworks nearby. A conversion scheme was put in hand and in 1941 a little group of 20 men arrived from Shepherds Bush to start work.

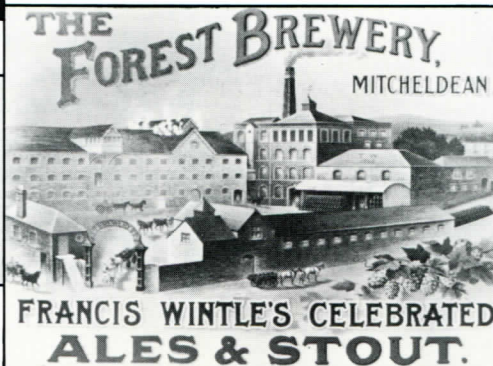
Among them was Henry Phillips, who retired last September as manager of parts manufacturing quality assurance. Henry, who was then a lad of 16, recalls "When we came in there was practically nothing except a few empty beer bottles.

"The machine shop, with belt drives, was set up in the cellar of the brewery. The press shop was in a galvanised iron hut and the assembly shop in another pre-fab building. The brewery stables were converted into a house for the boss, Tommy Law, who wanted to be on the spot.

"We had to make do and mend. If we wanted a hacksaw blade we popped up to the hardware shop and bought it out of petty cash."

Mitcheldean, once the centre of a busy coal and iron area, had lost its prosperity and seemed a desolate place to these pioneers. At first some of the Foresters did not seem to welcome the newcomers from London, who were billeted in local homes and in some of the village's many pubs.

Good relationships developed quickly when the factory began to take on local labour, among the first being Les Tuffley of the toolroom, who joined as a lad of 16 in 1941 and is now the longest serving employee.



Les Tuffley, the longest serving employee.

The factory has transformed the area, says Les, who served for 15 years as shop stewards convenor and is now a member of the Forest of Dean District Council and chairman of Mitcheldean Parish Council.

War production contracts kept the factory busy and by the end of the war the workforce had grown to 250, with a nucleus of skilled engineers and craftsmen well equipped to take the company into its next phase. This came with the negotiation in 1946 of an agreement to manufacture under licence cine equipment for the well known American company, Bell and Howell.

The small but growing company attracted the attention of larger organisations in its field, and in 1948 – by coincidence the year the word xerography was first heard in the USA – BAF became part of The Rank Organisation, operating as Rank Precision Industries.

In the same year Fred Wickstead joined the team at Mitcheldean as production manager, becoming general manager in 1951 and in 1958 chief executive of Rank's cine and photographic division with headquarters at Mitcheldean.

At a dinner in 1966 for the 16 Mitcheldean pioneers – four of the original 20 returned to London – Fred Wickstead recalled that he had trouble finding the factory when he arrived in 1948. He learned that he was to work in the maltings building, but found there was no desk. He eventually acquired one knocked up from a packing case.

In the 1950s Mitcheldean became Britain's largest manufacturer of 8mm and 16mm home movie cameras and projectors.



Henry Phillips (left) and Fred Wickstead in front of the old brewery buildings.

Architects

Looking back over 20 years, Fred Wickstead, former boss at Mitcheldean, pays tribute to Joe C. Wilson and Sir John Davis as "the architects of Rank Xerox."

Fred Wickstead believes he was the last to talk to Joe Wilson, founder of the Haloid Company (later Xerox), before his death in 1971.

"We were in Washington for a 'presentation' on future strategy which we both agreed was not telling us anything we didn't already know" Fred recalls. "Joe Wilson left me to keep a luncheon engagement with the American President. While I was having lunch we heard he had collapsed and died from a heart attack shortly after leaving me. It was a great loss. He was a real gentleman."

Sir John Davis is recalled by Fred Wickstead as a brilliant financier who in the interests of the company drove himself and his executives to the limit. "I once went to him with a report that I thought was pretty good, but he thought it could have been better and when I left I was literally reduced to tears."

The factory supplied the 16mm cameras that Sir Edmund Hillary took to the summit of Everest, and which had been tested at Mitcheldean at sub zero temperatures and fitted with special grips for use with gloved hands.

The factory also made equipment for the cinema industry and, as part of the Rank Organisation, became something of a showplace with visits from film stars and other celebrities.

Mitcheldean had by this time established a world wide reputation for expertise in both the electrical and optical fields and, alongside production of home movie equipment for Bell and Howell, other contracts were obtained. They included an agreement with another major American company, Burroughs, to produce film processors and cameras.

The factory expanded with the building of a new press and automatic machine shop in 1954, a new plating shop in 1956 and a modern assembly shop in 1958.

Meanwhile there was an event that few thought of great significance at the time, but was to put the expansion of the 1950s in the shade and open up a new chapter in the Mitcheldean story. It was the signing in 1956 of an agreement between The Rank Organisation and the Haloid/Xerox Company to form Rank Xerox.

Fred Wickstead recalls how it all began: "We were doing well with 8mm and 16mm cine equipment, with profits growing at 8% a

year, but we foresaw that this business would decrease with the build up of competition from Japan. They could make lenses cheaper and they had the whole world as a market, while the terms of our agreement with Bell and Howell excluded us from America.

"We were looking for diversification, new products. We appointed an agent in New York to look into what was being developed over there. He mentioned the Haloid Company's copier, but warned that certain of the 'big boys' in American industry had turned down this product.

"Nevertheless a meeting was arranged by Tommy Law, who was responsible to John Davis. They and the chief engineer, Stan Pratt, went over to have a look at the copier, and a decision was made. John Davis was able to offer what Haloid wanted – a company with finance, that had traded regularly with America and had experience in world markets as well as precision engineers and facilities for volume production.

"We were accepting a technical challenge and taking a big commercial risk, not knowing whether this new product would be successful.

"At this time Haloid relied on outside manufacture and our production unit at Mitcheldean was twice or three times the size of theirs. It was not until 1958 that they had a design and produced their own first copier, the 914.



The late Richard Dimbleby, an early visitor to Mitcheldean, with Fred Wickstead.



A young Don Elliott (centre) in earlier days of camera production.

"In 1959 Rank Xerox, which at that time was being managed by Rank, spent a large sum on market research to find out the potential of the 914 copier. It revealed that there was a market, but it was expected to total 750 machines that could be leased over a period of five years.

"So here was I, then running Mitcheldean as head of the cine and photographic division, taking the risk of tying up skilled engineers and craftsmen to make perhaps 200 a year of these machines.

"Mitcheldean was chosen as the production unit because we had a nucleus of highly skilled people, we were used to working with the Americans, and we were the most cost-competitive unit in the Rank Precision Industries group.

"Under the agreement Rank Precision Industries were to supply these machines to Rank Xerox at cost. I needed an order and there was a big debate about what it was to be. In line with the forecast of sales of 750 over five years there was a firm commitment for only 150 machines.

"They were to have 90 per cent special parts. This raised the problem of getting other manufacturers to supply such things as special motors for only 150 copiers. I met the suppliers and the upshot was that the commitment was raised to 250 and eventually to 400. That was another risk.

"But we did not have to worry for long. By the time we were ordering the jigs and tools for the 914 we learned that its reception in the USA had been far greater than the market researchers had predicted. It looked as though we should be making far more than the 150 first envisaged. And so it was."

Busy Builders

The growth of Mitcheldean in the 1960s was one of the highlights of the history of the west of England, said former works manager Don Elliott, adding:

"Every 12 months, sometimes more often, we put up a new building. Our builders, Giles and Son, at one time small local house builders, were never off the site for 14 years and became a major company."



The Mitcheldean Miracle

The Mitcheldean explosion of the 1960s began almost unnoticed as a low level try out of a new product. Many of those involved did not even know how to spell its name, the Xerox 914 copier.

Encouraging reports on its reception in the USA were coming in, but no one forecast that demand for the world's first dry copier would take off as it did.

At Mitcheldean a small production unit was set up in what was known as the Woodshop – previously used to make wooden cases for 16mm projectors. The area has now become building 11.

Much of the tooling installed was regarded as temporary, though it continued to operate for several years.

Here in November, 1960 a small but expert team of about 40 engineers and craftsmen assembled, largely from parts specially made by other manufacturers, the first xerographic machine ever made in Britain or Europe.

The records do not definitely establish who rented this first historic machine, but it was one of a group of early customers that included Standard Telephones and Cables, the London Stock Exchange and the Bank of England.

At first production ran at about one machine a week, and there was no problem about finding customers.

Former Works Manager Don Elliott recalls: "It was a revolutionary new force in the business world and early installations were prestige events staged by the customers with our executives and various VIPs attending. But very soon we were producing so many machines that we could not go to all the installation ceremonies."

These early 914s were less sophisticated than today's models but they did the job well and reliably. Many are still in use in the field, including one in Romania, designed to produce 2m copies over a period of five years, which was recently reported to be still going strong after 14m copies.

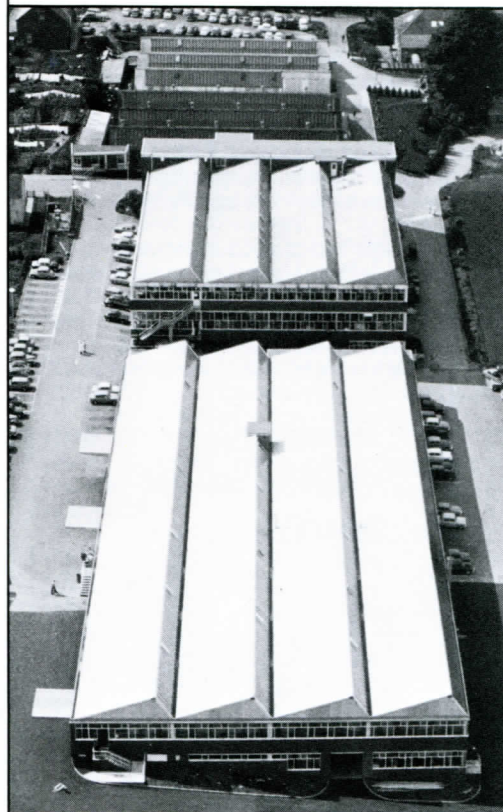


The 914 Copier.



The end of the earliest assembly line for the 914.

Within a few months production doubled and the team grew to 200. The capacity of the Woodshop was soon exceeded. Building 24, the first building erected specially for 914 assembly, covering 25,000 sq ft, went up in 1961. Within a year the 150 machines originally specified as a firm commitment, had been built.



An aerial view of the plant showing building 24 just completed.



These 914's were shipped to the Moscow patents office in the early 1960's. They are still going strong.

It was beginning to look as though Mitcheldean was on to a good thing. In 1962 a report in the house magazine *Vision*, proclaimed "Xerography has a tremendous potential. The 914 will copy anything written, typed, printed or drawn . . . The prints emerge at six a minute."

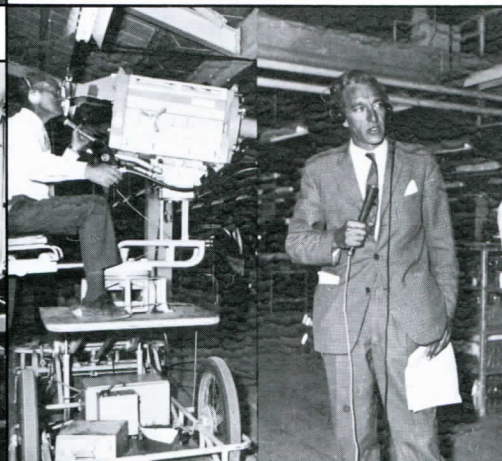
And in another issue of the magazine, Les Tuffley, in his capacity as works convenor, wrote "As the expansion of the XeroX project develops, it is hoped that the new field opened to us will help to overcome the seasonal fluctuation in the labour force that has been our lot in recent years."

In this year a 22,000 sq ft extension to the Xerox production building was added to increase capacity by 30 per cent, and soon afterwards the percentage of Mitcheldean's output devoted to the Xerox contract exceeded that devoted to Bell and Howell equipment.

There was a need for more skilled labour and to assist recruitment the company built houses and flats for employees. Local co-operation had to be sought to ensure that services kept pace with the extraordinary growth of the factory. At one time it was reported that when the Mitcheldean heat treatment plant was going full blast local housewives had problems with falling pressure for their gas cookers.

In 1963 more than £1m was spent on more extensions, including building 29. Much of this related to a move into high volume production of a new machine, the 813 desk-top copier, later succeeded by the 660.

In the meantime the world wide expansion of Rank Xerox was in progress, with the establishment of Fuji Xerox in Japan to make the 914 and plans for the first Continental plant at Venray in Holland. Chief executive John Davis described the demand for Xerox machines as "explosive."



Raymond Baxter, linked to the Dorchester, launches the 813 from Mitcheldean.

The highlight of 1964 was the spectacular debut of the 813 copier in London. The launch was by John Davis at a gathering of shareholders and VIPs at the Dorchester Hotel, linked to Mitcheldean by closed circuit TV. The guests watched as Raymond Baxter was followed by the cameras on a tour of the factory, showing the 813 in production.

With demand soaring Mitcheldean was again bursting at the seams and the company bought 22 acres of adjoining farmland to add about 340,000 sq ft of new buildings. The workforce, which had been around 1,200 in the early 1960s, grew to nearly 2,000.

Changes came in 1965. The Mitcheldean factory, which had been operated by Rank Precision Industries on behalf of Rank Xerox, became part of the manufacturing division of the growing Rank Xerox empire, involving the transfer of net assets worth more than £5m.

All the available space was now needed for Xerox production and the rights to manufacture and market Bell and Howell equipment were sold back, and machines used on this work for 20 years were transferred.

Sales of the desk-top 813 boomed, earnings rose at a cracking pace and were poured back to keep up the momentum.

Henry Phillips, who was then involved in making and ordering tools, recalls that at this time money was no object. Authorisation came quickly for whatever expenditure was needed.

Fred Wickstead, who became chief executive of Rank Xerox at Mitcheldean in 1965 recalls going to see John Davis with a foolscap sheet outlining a £1m development plan. "He asked if I was satisfied that the plan would produce the results and the revenue forecast and getting my affirmative reply he said go ahead" said Fred. "We went ahead and accomplished what had been forecast."

In the six years of producing copiers at cost for Rank Xerox, revenue grew at the rate of 30% a year, Fred Wickstead recalls.

In 1965 the 914 was still being produced as cheaply as in 1960, despite inflation. In the first year they had expected to make 50 machines. Ten years later output was 2,000 a year. In the ten years from 1964 to 1974 revenue went up 32 times and profit before tax 57 times.

The year 1966 saw the introduction of the 2400 model, later to become the 3600. By now Mitcheldean was selling to 20 major countries. A group of Employees were invited to attend a presentation to The Rank Organisation of its first Queen's Award to Industry for export achievement.

Another landmark came in 1967 with the completion of a design engineering unit where electrical, mechanical, electronic engineers, technical experts, draughtsmen and designers were housed all together in a European design

centre for xerographic products. Here machines developed in the USA were 'anglicised' or modified to make them suitable in other markets and adapted to use British or European components.

By 1967 it was calculated that Xerox machines worth £65m were in use throughout the world. At Mitcheldean the first computer was introduced, and this year also saw the opening of reconditioning centres at Mitcheldean and Venray where rented copiers were taken apart, rebuilt and returned to customers with the latest modifications incorporated.

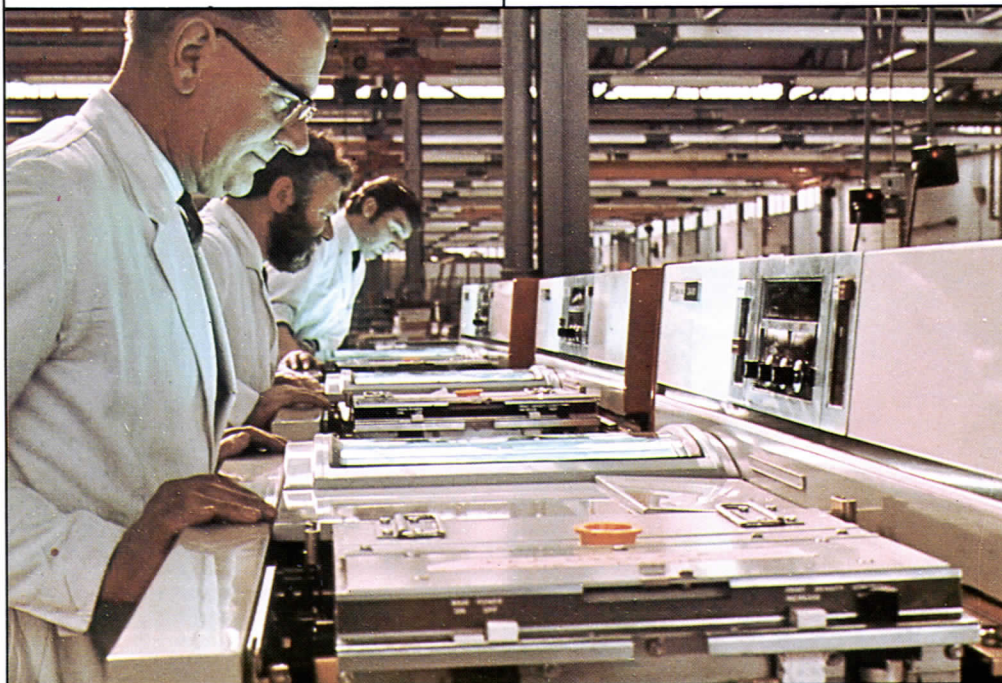
Mitcheldean got a new name in 1968, becoming part of PSOD (Production and Supply Operations) Division, with Fred Wickstead as director, responsible also for the factories at Welwyn, Elstree and Venray.

The 720 copier, derived from the original 914, won a gold medal for the company at the Leipzig Fair, and there was the launch of the

3600, a more powerful version of the 2400 using new techniques and able to produce 3600 copies per hour. The Mitcheldean design team played a major part in the development of this machine, the company's first entry into the medium range copier market to compete with offset litho printers. A team from Mitcheldean went to Venray to help to start up an assembly line for the 3600, which then evolved into the 7000.

Expansion of the factory continued with a start on building 40 to add 220,000 sq ft of extra space the following year for assembly of the successful 3600.

By the end of 1969 no less than 46,000 copiers had been installed and the workforce at Mitcheldean had grown to around 3,000. Among them were many old hands who, looking back over an incredible decade, realised that they had taken part in one of the most remarkable business success stories of all time.



3600 machines undergoing their final tests.

Chased

Les Tuffley, Mitcheldean's longest serving employee, was one of the first Foresters to start work there as a youngster.

"Conditions in the old brewery building were very primitive," he recalls. "When the time came to wash our hands we took turns to get a bucket of water and carry it up the stairs. Afterwards we had to take it down and throw away the dirty water."

"There was an opening in the wall in the old bottling plant and one day I threw the dirty water through the opening. Unfortunately the maintenance foreman was passing. I ran and he chased me – and went on chasing me for a fortnight."

Les, who had 15 years as shop steward convenor, said he's had few complaints about the company as employers. "There are a lot worse and not many better" he thinks.

He recently met a local purchaser of a 2300 desk top copier who, he said, had nothing but praise for the machine.

Romance in the brewery

Henry Phillips, former manager, parts manufacturing quality assurance, who retired last September after 40 years service, was one of the original team of 20 who came from London in 1941 to work in the old brewery.

He was then a lad of 16 and he recalls meeting his wife Jo, who was among the first locally recruited employees.

"While working on a machine she broke the tap she was using. She asked some of the men how she could get it mended. It was, of course, unrepairable but as a joke they sent her to me saying I would deal with it. It was the start of a friendship that led to our marriage."

Jo worked in the Engineering Print Room until she retired in 1978.



Bombshell

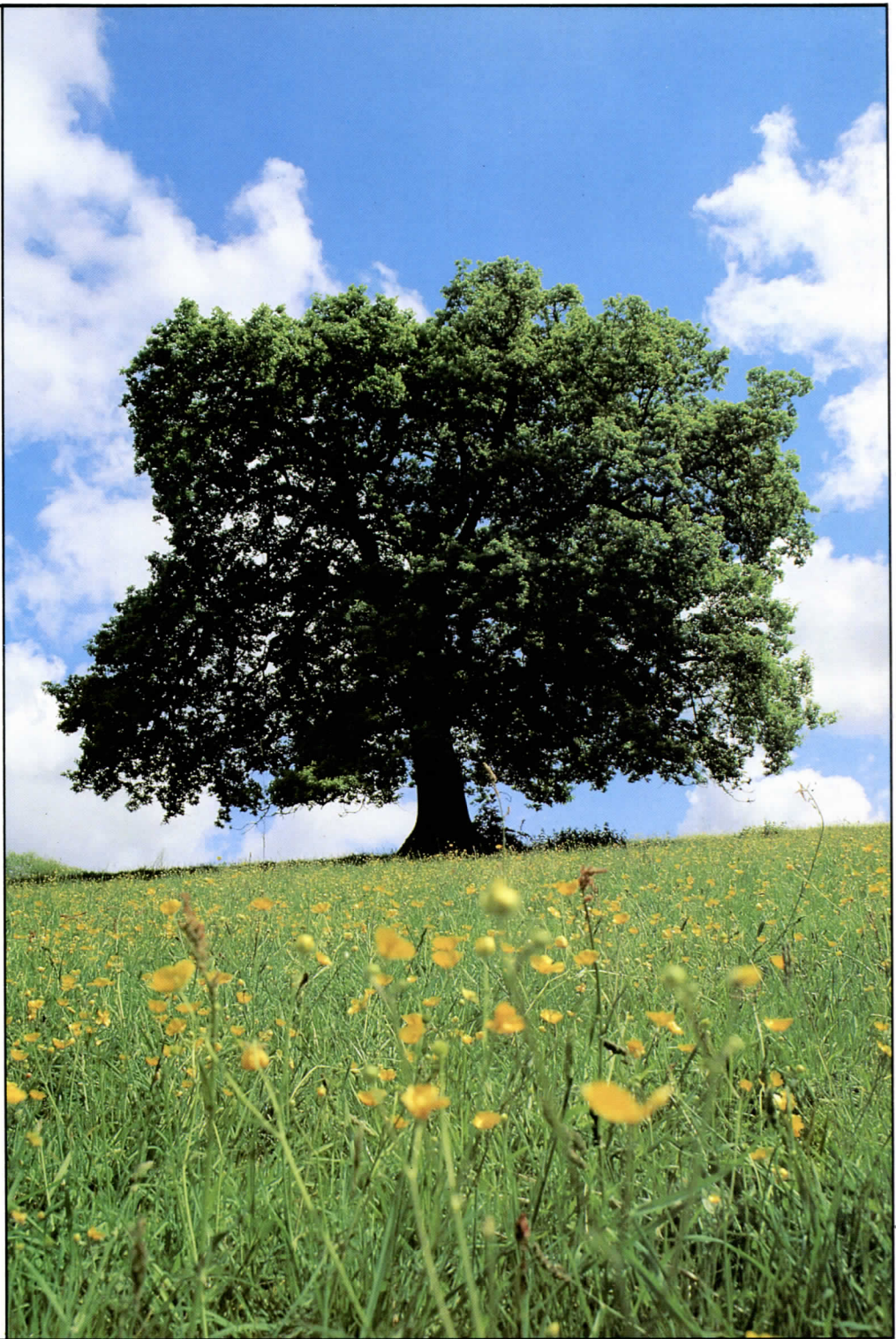
Among those who worked closely with Fred Wickstead in the 1960s was Mr Robert Hall, now retired, formerly General Manager of the mechanical products division of Plessey, a major supplier of components for the Xerox 914 and the 813.

"We made nearly half of these early copiers – chassis, frames and covers, virtually all the mechanical parts" Mr Hall recalled.

"We worked closely with Fred Wickstead and it was fortunate that he and I got on like a house on fire, for it was initially a very peculiar business arrangement. At Mitcheldean when they first started they had no idea what sort of bombshell they had released. It was impossible to draw up a programme; every target they set they passed and doubled. Instead of quoting prices we had a remarkable arrangement by which we made the components at cost plus a very modest margin. They studied our methods and made suggestions and we reciprocated.

"Later, of course, we shared in their success. The business revolutionised two divisions of Plessey – mechanical products and sheet metal divisions – as we grew alongside Rank Xerox.

"We had people living in Mitcheldean and I was a regular visitor. I also paid visits to America, some with Fred Wickstead, and to Holland and France. We still have friends in America, members of Xerox, with whom we exchange regular personal correspondence, visit each others homes and even exchange families. Xerox with us, as with thousands of others, just became part of our lives."



More growth in the 1970s

In 1969, Xerox Corporation acquired the controlling interest in Rank Xerox, The Rank Organisation retaining 48.8 per cent of the voting shares.

Rank Xerox then had 18,000 employees in 23 countries, among them 3,000 at Mitcheldean, where net assets – buildings, plant and machinery – increased from £6m in 1967 to £14m by 1971.

A year later the figure had risen to £17m with the construction of the International Supply Centre covering 350,000 sq ft and described as the largest single span building in the west of England.

This was followed by buildings 44, 50 and 51 the new office complex with a special area to house the more powerful computers that were being installed.

Another high volume product, the 4000, had its press launch at Mitcheldean in 1971, and this was followed by the 4500 (which evolved into the 5400 and then the 5600) developed at the factory as a new high volume copier in the medium range capable of producing 45 copies per minute. Using printed circuits these machines marked the first entry into electronics.

The company won its second Queen's Award for export achievement in 1971 and its third in 1972.

In 1971 Fred Wickstead, who had steered Mitcheldean through the exciting 1960s, was appointed as a director of the parent Xerox Corporation.

In 1973 the last 720 (the remodelled old faithful 914) came off the assembly line, to be replaced by the more powerful 1000 and the 3600 was phased out as the factory survived the energy crisis and made plans for its next big development, the Xerox 9200 duplicating system, which came in 1974-75.

Once more Mitcheldean's modern production facilities and expert staff were chosen to make this important new Xerox product, designed to meet the needs of copying centres and to compete in the tough offset litho market.

The project involved an extensive re-tooling programme and some £50m was invested to provide the most up to date production facilities, including computer controlled machine tools, at that time believed to be the most advanced installation of its kind in Europe.

The 9200 high speed print system incorporated many technological advances as do the newer machines, notably micro processors used for the in-built electronic diagnostic panel which, if a fault occurs, tells the operator exactly where it is and what needs

to be done to correct it.

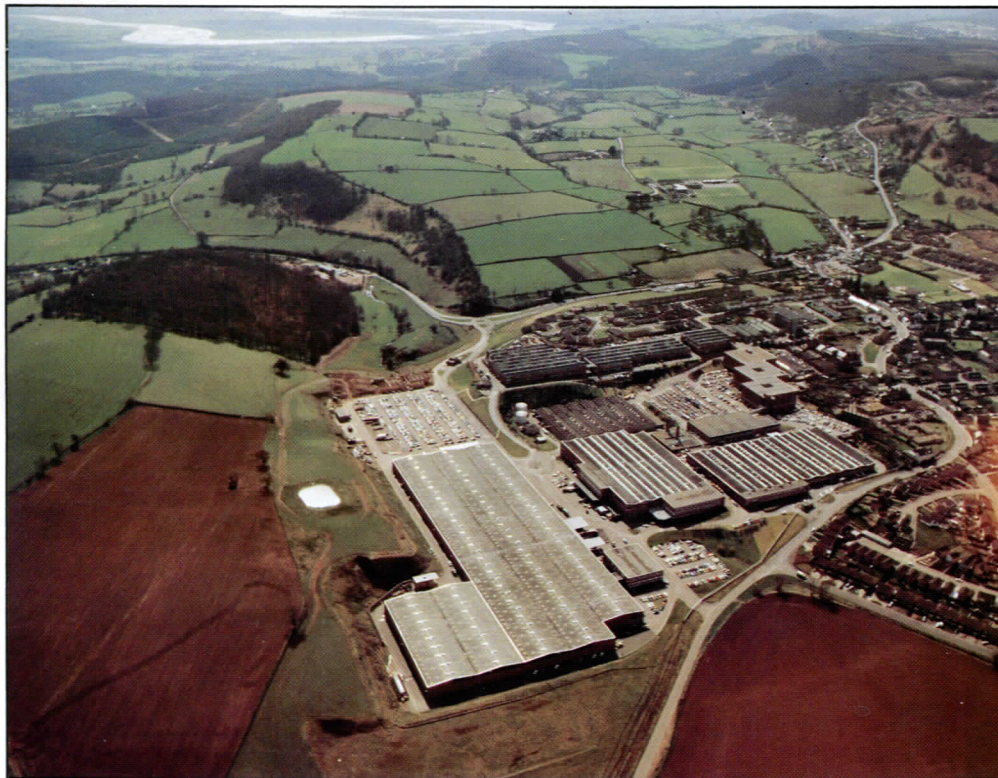
In its early adoption of micro processors, Xerox and Mitcheldean were in their customary place as leaders in the field. The new techniques required an extensive training programme embracing not only engineers and craftsmen but inspectors and salesmen.

As Don Elliott, works manager until his retirement in February, put it "We've been in micro processors a long time.

"We don't look at them, as some do, as a development that will put people out of work. They improve the product. We believe that if we reject new technology, industry is doomed; others will get ahead. We were in at the start of the micro processor revolution and are ready to take advantage to keep in the lead."

At the same time the factory's tradition of producing small copiers, going back to the 813 and its successor the 660, has been revived by the introduction of the new 2300 for the growing desk top market.

This machine broke new ground as the first big multinational Xerox product. Developed and designed by Fuji Xerox and launched last year, its assembly from FX parts was assigned to the Lydney plant following an exceptional effort by a Mitcheldean project team headed by John Roberts. Working to a limited time scale they introduced new assembly and material handling techniques to gear the plant for the high-volume, low unit cost production that was essential to the success of the product in the market place. All round co-operation resulted in the first machines being shipped on schedule and the 2300 has won its claim to fame as the highest volume product the factory has ever produced. It takes its place in the Mitcheldean saga that began 21 years ago with that small team working in the Woodshop on the revolutionary 914.



This aerial picture of the Mitcheldean site was taken in the late 1970's.

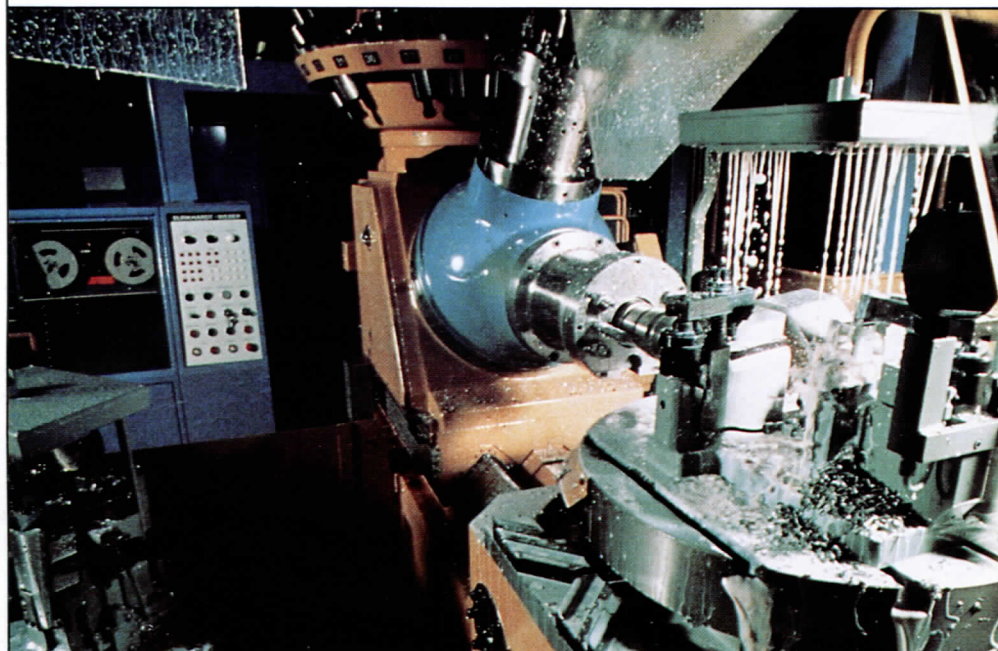
How it looked from the outside

Mr Keith Harris, Secretary of the Forest of Dean District Council, said: "It was most fortunate that the Rank Organisation came to this area when it did, and who could have imagined in those early days the tremendous impact which the Company was to have on the area in later years?"

"The factory has been of enormous benefit to the local community, and its expansion during the 1950s and 1960s probably did more than any other single development to avert the very serious consequences of the closing of the mines in the Cinderford area during that time.

"Its importance has, of course, always been recognised by the local authorities, but particular tribute is due to the County and District Councils of the day for doing everything in their power to facilitate the expansion of the factory by providing the necessary services (water supplies and sewerage), by helping with housing, and on two occasions even making available the necessary land for expansion.

"The factory has consistently employed a high proportion of local people and, as the largest wage-payer in the District, has undoubtedly been a major contributory factor to the economic stability of the area."



One of the Burkhardt and Weber numerically controlled machining centres installed for the 9200 line.

How engineering met the challenge

When it was decided some twenty years ago to start producing the 914 copier at Mitcheldean, the factory's design engineers faced a new and major challenge. At that time they were part of Rank Precision Industries and their experience lay in the design of 8mm and 16mm cinematographic equipment and associated microfilm systems, and it was necessary for them to quickly learn the new technologies associated with the xerographic copier.

The design of a 914 had to be changed to accommodate the UK and European electrical requirements and to enable the machine to accept European paper sizes and, at a slightly later stage, to ensure that the design complied with British and European safety standards which were at that time being developed.

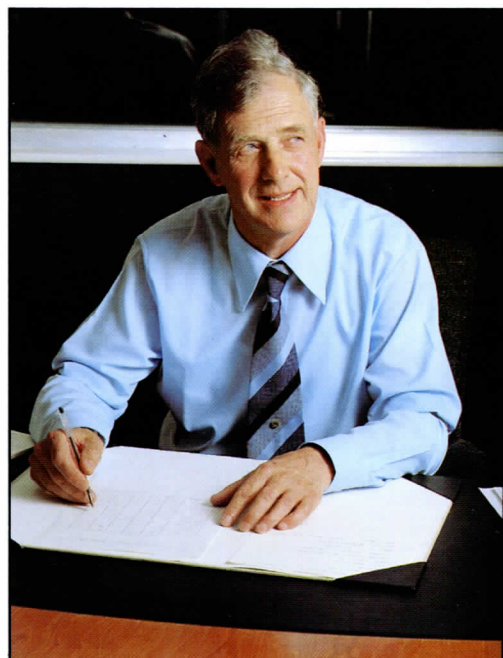
How these problems were tackled is recalled by Ken Fox, now Manager, Engineering Operations, one of Mitcheldean's veteran engineers, with thirty years service.

"We decided that the electrical requirements of the UK and European markets could best be met by changing the British made machines' internal electrical systems to operate from 240V, 50 Hz compared with the US machine 115V, 60 Hz," he said. "This presented a number of problems. For example, 50 Hz components usually require more space than 60 Hz components and a considerable amount of

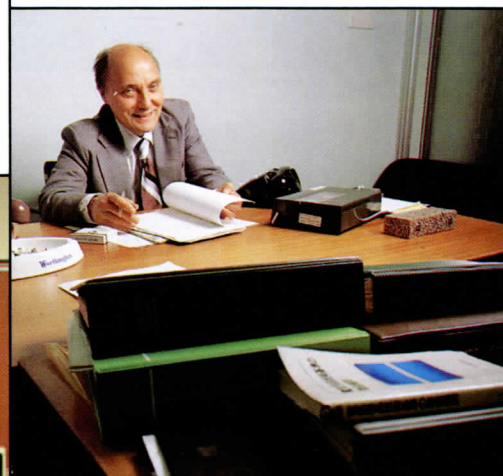
juggling and repositioning was necessary to fit them in. Differences in equipment used for manufacture at Mitcheldean compared with that used in America also meant that parts had to be redesigned or changed without affecting the basic performance specification.

"The then new British Standard, BS 3861, landed on my desk whilst we were making the 914. Its application was directed primarily towards relatively simple electrical devices and from recollection, I believe, was aimed at resolving some of the problems which were starting to become evident from imported electrical equipment. However, we learned that in future, Government departments would not buy equipment that did not conform to this standard and this brought great pressure on us to obtain 914 approval. I believe we were the first to submit and obtain approval for a machine as sophisticated as the 914 against the new standard, and since that time all our machines are designed to comply not only with the British standard, but the equally stringent standards in Europe and elsewhere."

Following the success of the 914 and the family derivatives (720/1000) the late 1960s and early 1970s saw the emergence of more sophisticated machines operating at higher speeds with many new features and embodying new technologies, particularly solid state controls and programmers. It was evident that closer liaison at the design stage was necessary to ensure that initial American designs took account of the needs of Rank Xerox, and Mitcheldean engineers were located in America to contribute to the initial design



Engineering's Ken Fox — from small cameras to mammoth duplicating systems.



Product safety manager John Walker with growing volumes of safety manuals.



Engineering development work now has a growing electronics content.

work and acquire product knowledge that could be applied when they returned.

Increasingly complex designs and ever more challenging schedules led to an increased Mitcheldean engineering presence in America to help in creating new machines for international markets, and the 9400 was an early example of a combined team approach. The RX resident team, backed up by a support team at Mitcheldean, worked closely with the US design team in identifying and designing the unique RX requirements for the 9400. "Our engineers played a large and significant part in creating the RX 9400", said Ken Fox. "Among other activities they negotiated the supply from European sources of some of the unique components that would eventually be built into this most successful high speed machine."

Resident engineers from Mitcheldean are today working in America to ensure that the emerging and multinational designs meet RX requirements in specification, schedules and costs. Not the least of their tasks is to make sure that the products meet new and more stringent safety standards emerging in Britain, Europe and Japan, and advising on the impact of EEC legislation affecting health and safety in the workplace.

The engineering staff at Mitcheldean includes specialists in electronic, electrical, mechanical and optical design, with the usual draughting, component engineering and system test capabilities. The engineering emphasis remains to provide low cost, high performance and reliable machine designs and in seeking opportunities to prolong the life of existing products by appropriate accessories and additional features.



Terry Quartermaine (left) Alan Phelps — supply lines to the other side of the World.



Gerald Cooke looks after imports and exports.

Supply faced new demands

In the decade of swift expansion that followed the launch of the 914, those responsible for supplies and distribution faced the same problem as everyone else at Mitcheldean – shortage of space.

In efforts to keep pace, the department was shuffled from place to place. In 1963 Building 24 was occupied for storage, distribution and export packing of machines. Storage and distribution of spares, which had been based in London, was transferred to the same building in 1964-65, and the capacity of the 9ft high racking was soon exhausted. In 1966, to make room for the growing volume of spares, machine distribution moved to an external warehouse at Gloucester. A year later spares operations, having outgrown Building 24, moved to Building 32.

An International Distribution Centre was established at the Gloucester warehouse in 1968, and in June, 1972, with the completion of Building 41, the biggest on the Mitcheldean site, all supply and distribution operations were finally centralised in this 350,000 sq ft building. In November, 1972 it was chosen as the location of one of the Company's three International Supply Centres, the others being at Welwyn and at Venray in Holland.

Today, under the management of Terry Quartermaine, the Mitcheldean International Supply Centre is one of the largest and most sophisticated units of its kind in Britain.

It receives and stores machines made at all manufacturing plants, including those made at Mitcheldean, in America, Canada and Japan, and handles their distribution worldwide to 35 operating companies and branches.

Equally important is the Centre's spares storage and distribution function, again embracing the 35 operating companies. Spares are stocked for every model made over the past 20 years, including the original 914. The still substantial demand for 914 parts indicates that many of these veteran models are still going strong.

In the spares area of the vast building there are stocks of nearly 28,000 different parts, held in varying quantities and ranging in size from small screws to large paper feeders. Some 12m of these parts are pre-packed each year for storage, the pre-packs later being packed for shipment by road, sea or air in cartons, crates, containers and trailers.

Each day the Centre receives about 1,000 demands for parts from the operating companies. They are processed by a computer warehouse order control system called INTERPICS (International Programming and Inventory Control System). The computer

checks the order against data held in its memory, identifies the location of the parts required and prepares a picking list from which the order is assembled. The computer also generates export invoices and through a link with the supply accounts system provides export accounting information.

To ensure equity of treatment, consignments are despatched to each operating company on a pre-scheduled date, the goods being picked one day and packed the next.

This routine is only interrupted long enough to process an emergency order, arising occasionally when a machine is out of commission for lack of a spare not available from the operating company's stock or local branch or international stores.

A fast turn-round of orders has been achieved by operational procedures introduced in recent years by Operations Manager Alan Phelps. A high density cubic utilisation storage system makes maximum use of vertical space in the 25ft high warehouse, with fork trucks operating in narrow aisles between roof-high racks. Manual handling of machines has been reduced by a dynamic storage system, with tiered tracks so designed that machines are gravity fed automatically out of storage on a first in, first out pattern. There are canopies for vehicle loading under shelter, with special docking facilities permitting fork trucks to drive on to vehicles.

The International Supply Centre is an autonomous unit on the Mitcheldean site, reporting to Director – Material and Supply Operations. Its many responsibilities include business and inventory planning, control of movement of goods and packing for manufacturing, design of packing, forecasting of supply requirements, recording machine serial numbers and location, and management of a "squirrel" warehouse holding excess stocks that might be used later.

The Centre's other vital jobs are management of import and export services and the import and export duty relief system, for which a computer program is being planned. This work involves a vast amount of documentation relating to the international movement of goods.

In 1978 the Company was one of the first six in Britain to be entrusted with a Local Import Clearance, under which imports are allowed to pass through Customs in containers sealed at source, to be held on site for inspection if requested before clearance by Customs staff based in Gloucester.



I.S. unit grew with Mitcheldean

When production at Mitcheldean was surging ahead in the late 1960s it became apparent to management that a computer was needed as an aid to materials planning and production control and to process financial information.

Consequently, in October, 1967 they replaced the punched card systems with Mitcheldean's first computer, a small Honeywell 120, using magnetic tape.

Soon afterwards, in July 1968, Jack Bonney joined the Company from Hawker Siddeley Group and was appointed manager of the information systems team at Mitcheldean.

Jack Bonney, now Manager, Group Co-ordination and Control, Information Systems, early decided that the Company's then standard of tape-based hardware, was inadequate for manufacturing applications, and that disk-based systems were essential.

Gwilym H Peregrine, at that time responsible for production control, purchasing and information systems, was anxious that the needs of manufacturing be fully met and instructed that work should commence on planning the next generation of hardware. To hold the situation in the interim, the Honeywell 120 was replaced in October 1968 by a larger Honeywell 1200 machine, still tape-based but better able to cope with growing volumes. The 1200 was later augmented by the addition of a Honeywell 125.

Jack Bonney recalls: "Meanwhile a joint working party with Headquarters Information Systems was established and, after an in depth study of manufacturing's system requirements, the need to move from the RX standard configuration was confirmed. The outline systems concept was used as a basis for an Invitation to Tender which was circulated to 14 computer manufacturers.

"The decision was made to move away from Honeywell and go with General Electric who, in addition to offering good hardware with disk storage, had excellent operating software and, more important, impressive data base management software. As it transpired Honeywell acquired the computer division of General Electric the day after our contract was signed, so gaining full marks for tenacity!

"The GE 437 was installed in March 1971 and work commenced on the design of a new set of systems and the creation of the first module of a data base held on disk. Financial systems were converted, but the main thrust was to be on material planning and control."

With growth continuing, it soon became obvious that still more power was needed and, in November 1973 a large multi-programming



Jack Bonney and changing friend.

H6060 was brought in to replace the GE 437. The 6060 was housed in a new purpose built block (Buildings 50 and 51) which has since grown to be a four storey office complex. Plans for the building were prepared with Xerox's very strict standards of data centre security in mind and it would not have been possible to convert any existing building to meet these extremely high standards. At the same time, a smaller but compatible H6040 was ordered for the Venray Plant.

This powerful complex allowed the completion of design of the SOLAR system based on an integrated data base, probably the first such data base to be implemented in Xerox. This system is still operative in Mitcheldean today, but the computer installation has seen further changes, with the H60/40 now replaced by a large and powerful H66/40.

Looking ahead, there is likely to be an increasing need for data transfer between Xerox and Rank Xerox and, indeed, a plan to link the EMSD data network to the Monroe

County data network by trans-Atlantic cables is currently under review. There will also be a greater move to "distribute" some applications and place the processing much nearer to the user. A good example is 'SUE', an on-line stock control system based on a mini-computer giving the user, via his own terminal, the means directly to upgrade and retrieve information. Other, more "self-contained" systems, using micro-processor based equipment probably with "floppy disks" will follow and several systems based on the Xerox built Diablo Ranger are planned for Mitcheldean.

"In data processing, the one thing that does not change is the rate of change," says Jack Bonney.



*Ron Morfee, Director of Manufacturing at Mitcheldean, looks
Into the '80s*



Twenty one years ago, when the Mitcheldean success story began, no one could have envisaged what the plant would look like today. It is even more impossible now, at a time of ever-accelerating technological and industrial change, to project ourselves 21 years into the future.

We can be justifiably proud of our performance in the past year, our best for some time. We made a major contribution to the effort that earned for our Company its fifth Queen's Award for Exports. The Company has recently launched six new products, four of which are being built at Mitcheldean.

The longer term outlook depends on our success in adapting to conditions in the new world in which we work, which is very different from that of twenty, ten or even five years ago.

There are some parallels. It has been recalled elsewhere how Fred Wickstead in the 1950s foresaw increasing competition from Japan in the market for cameras then made at Mitcheldean.

Today we find ourselves under a similar threat. Our success as a Company has attracted fierce competition from Japan, especially at the lower end of the copier market, but also from such giants of American industry as Kodak and IBM.

In the early days the name of the game was more and more output of machines of good quality. The cost of producing them was secondary.

This situation no longer applies. As our Chairman, Mr C Peter McColough, said recently:

"Achieving constantly higher levels of cost effectiveness is the most critical task facing Xerox over the next several years."

This means changes in the way the work of Xerox is organised and carried out world-wide. For us at Mitcheldean in particular it means a new look at how machines are designed and made and how parts are bought or manufactured – the whole range of our operations.

To a greater extent than ever, everything that affects the cost of a machine or spare part has to be under constant scrutiny and challenge, whether it is the cost of materials, labour or overheads.

In the early days of explosive growth it was not too important if there was some duplication of design or manufacturing effort. It did not much matter if there was a very high rate of engineering change so long as we kept up with market demand.

The new way, the new world-wide philosophy, is different and can be summed up in two key phrases:

So far as new designs and models are concerned, we have to organise ourselves to get it right first time, so the message is

DO IT ONCE AND DO IT RIGHT.

On the manufacturing side, all operations are under challenge, and the message is THERE'S ALWAYS A BETTER WAY. We are going to find it and do it that way.

How are we responding to these new priorities? I would say we can see some good progress in many aspects of improving costs.

But competition demands that this has to be a continuing process, a new way of life, not a one-off effort. To meet and beat competition our cost cutting achievements have to be repeated again and again.

Our future at Mitcheldean will be shaped by many factors. Some, such as the actions of competitors and economic conditions in world-wide markets, are outside our control.

But in other ways the maintenance of our reputation as one of the major contributors to our Company's progress is in our own hands.

The key factors are that we should continue with growing determination to

Deliver good quality products and spares on time

Improve our cost effectiveness, and Maintain good employee relations. ”

Office of the future

Jack Bonney, Manager Group Co-ordination and Control, Information Systems, based at Mitcheldean, sees direct use of small computers as a move towards office automation, a sphere in which the Company has a dual interest both as suppliers and users of modern office equipment.

"There will be more capital investment to improve productivity and efficiency in the office of the future" he predicts. "For access to information stored in computers, VDUs (visual display units) will replace much of the present paper work, though print-outs will be needed in many cases."

"Instead of posting letters there will be electronic mail, a system in which what the secretary types will appear on a remote terminal in the office of the addressee."

"Information systems may also move into other functions, such as quality control."

Far left, in the Boardroom, Ron Morfee (seated centre) and the Mitcheldean top management team standing from left to right Ken Fox, engineering; Chris Wood, technical services; Richard Cowser, materials; John Wigg, assembly; (seated) Gerry Lane, finance and business planning; John Wood, parts manufacturing; Derek Knibbs, personnel; and Jack Bonney, information systems. Missing is Terry Quartermaine from International supply.



Two products for the 1980's.
Top, the Xerox 3300, bottom, the Xerox 8200 system.





*"Roam on! The light we sought is shining still.
Dost thou ask proof? Our tree yet crowns the hill."*

Matthew Arnold 1822-1888.



