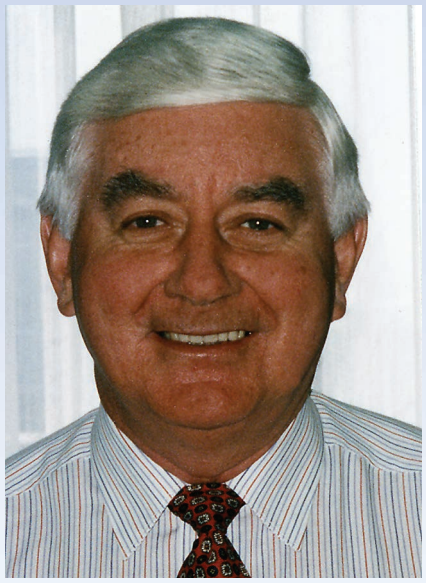
First 100 years of ALSTOM South Africa

INDEX



ALSTOM SOUTH AFRICA
THE FIRST 100 YEARS
was researched and written by Mike Sullivan,
MD of GEC ALSTHOM from 1989 to 1996

Foreword

Mark Wilson

I would like to thank my predecessor, Mike Sullivan, and all management and employees past and present who were instrumental in compiling and unravelling the complex history of the company.

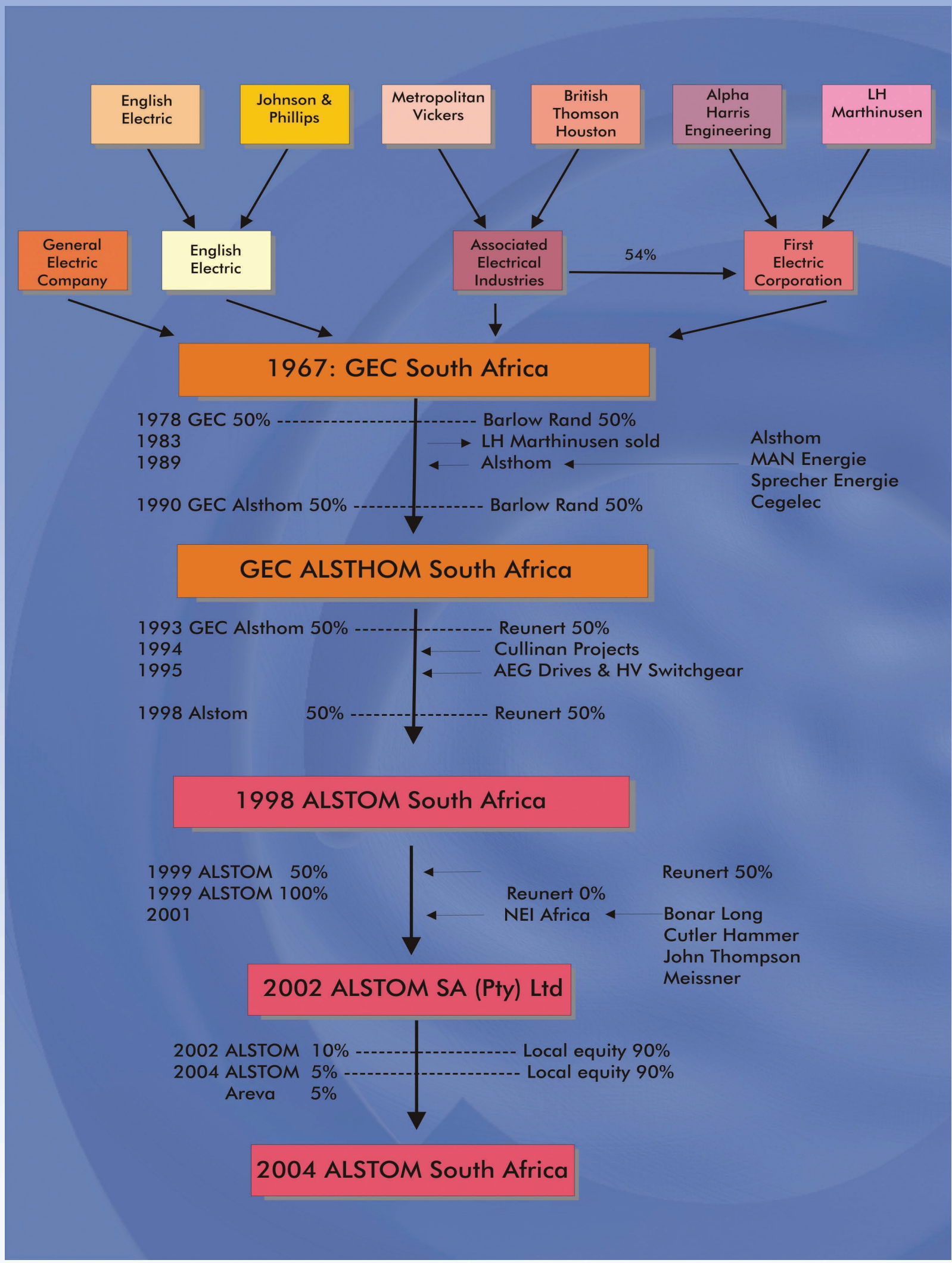
The development of the company and its associated principals over the past hundred years closely followed the infrastructural growth of South Africa as a whole. The company made significant and lasting contributions to the electrical, traction and mining infrastructures that form the backbone of the economy today.

The country is about to embark upon another major infrastructure upgrade in the power and rail sectors, which should be followed by further strong industrial and economic growth.

Our challenge, with our principals and new partners, is to emulate the achievements of our predecessors and to participate actively in the growth of the economy.

I believe all the stakeholders past and present can be justifiably proud of the contribution that the company has made over the past century.

How ALSTOM South Africa came about



INTRODUCTION

One hundred years ago South Africa was recovering from the Anglo Boer War, with refugees streaming back to the then Transvaal and Orange Free State, their place in the Cape being taken by a flood of immigrants drawn to the country by the prospect of reconstruction.

The pattern that the reconstruction would take was to be greatly influenced by a company appearing for the first time in the Cape Town directory of 1903 - the British General Electric Company Limited, "manufacturers of all electrical machinery, supplies and accessories".

In the following years the GEC group in South Africa would grow organically, and also by gathering in many other fine companies who brought with them a rich blend of talent, skills and experience. Inevitably, the group would face many challenges, including changes of direction, of name and, eventually, a change of ownership. It would survive these well, largely due to the quality and character of the people it was able to attract and retain.

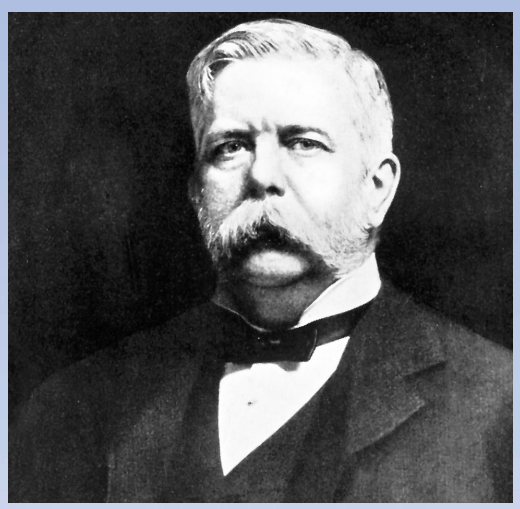
A hundred years later the group is ALSTOM South Africa - locally owned, highly successful and recognised today as the leading group in power engineering in South Africa and the southern African region.

PUTTING DOWN ROOTS

To understand the growth and development of GEC in South Africa, it is necessary to trace the roots of some of the companies that, over the past 100 years, have been incorporated into the group. They have their origins mainly in Europe and the UK - and the latter in particular, as the UK was by far the largest investor and also the definer of standards. British electrical engineering companies with activities in South Africa enjoyed the lion's share of the business available in the country.

At the turn of the century the United States-based Westinghouse established a company in Manchester known as British Westinghouse. This was to become the well-known Metropolitan Vickers, which set up a branch office in South Africa soon after World War I and was a leading supplier of generating plant, mine winding equipment and electric locomotives, although no local manufacture was undertaken at that time.

At about the same time, the Thomson-Houston Company, also of the US (and later to become the American General Electric), started up in Rugby as the British Thomson-Houston Company. It also was represented in South Africa from the early days, but it was not until 1948 that it actually established its own office here, supplying traction substation equipment and generating sets imported from the UK.



George Westinghouse founder of Westinghouse Electric & Manufacturing Co.

As these two companies expanded in the UK, ties with the US weakened and eventually, control of both passed to a British financial organisation, Associated Electrical Industries (AEI). The latter also acquired control of several other electrical equipment manufacturers, including Edison Swan, Henley-Simplex and Ferguson Pailin, all well-known names at the time. The various companies continued trading under their own names until 1958, when the decision was taken to merge them into one cohesive group trading under the name of AEI.

In the same period a number of other British engineering companies, producing a wide range of products, came together to form the English Electric group. These included Siemens Brothers, Willans and Robinson, The Phoenix Dynamo Company, Vulcan Foundry, Robert Stevenson and Hawthorne and others. English Electric had also established itself in South Africa in the very early days, having registered its first company in Cape Town in 1919.

In September 1967 English Electric UK acquired the worldwide interests of Johnson & Phillips, whose main business was in medium voltage switchgear and transformers. Based in Driehoek, Johnson & Phillips South Africa had a very strong position in both of these markets. In switchgear alone it had probably three times that of English Electric, and its transformer business was also much larger than English Electric both in volume and range. English Electric was delighted to see the end of such a formidable competitor and it was believed at

the time that it was the success of Johnson & Phillips in South Africa that had prompted the worldwide take-over.

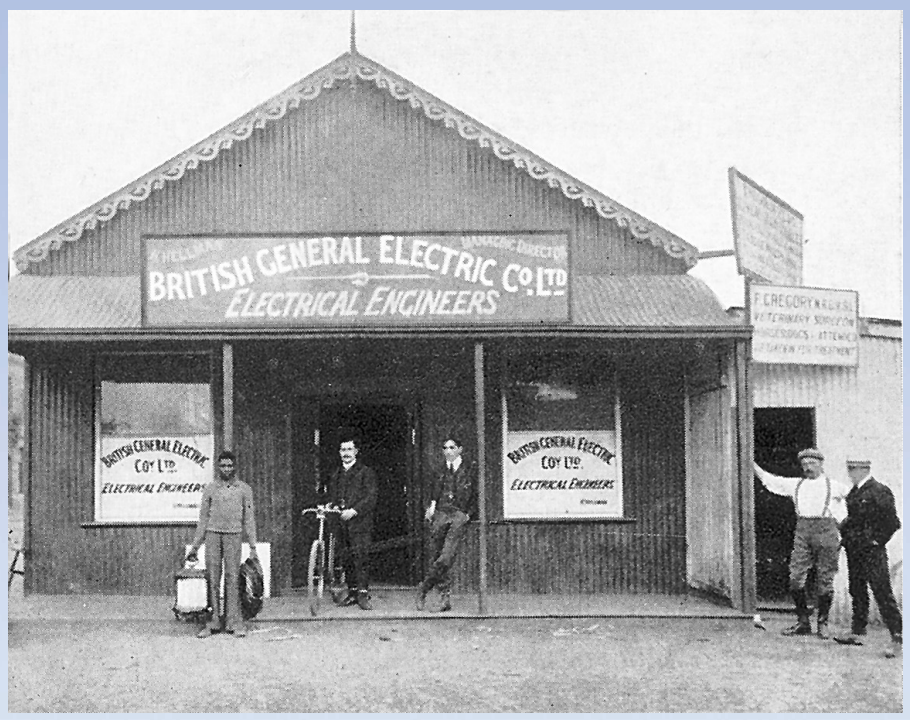
Rationalisation plans determined that all transformer and mini-sub production would be transferred to Driehoek, while most switch-gear manufacture would move to the English Electric factory at Benoni but, before these plans could be carried out, talks between GEC, AEI and English Electric in Europe had advanced so far, it was decided to leave Johnson & Phillips at Driehoek, where it remained until the main group rationalisation programme began in the late 1960s.

Another UK-based group in South Africa at the time was The (British) General Electric Company that incorporated Fraser & Chalmers, well known for the manufacture of mining equipment. It was, however, overshadowed in the power-engineering field by AEI and English Electric, despite having arrived in the country some time earlier.

Northern Engineering Industries (NEI), another UK-based group, was a loosely knit group of well-known electrical and mechanical engineering companies that could trace its lineage on the electrical side to Reyrolle Switchgear, which was founded in the UK in 1886 and established an operation in South Africa in 1926 although, again, its first manufacturing facility was only set up in 1954. In order to strengthen its position in the UK, Reyrolle had merged with the turbo generator manufacturer CA Parsons in 1968, and in 1969 acquired the Bruce Peebles group. In 1977 Reyrolle Parsons joined Clarke Chapman, suppliers of material handling plant, to form Northern Engineering Industries. The South African arm of NEI underwent similar changes. In 1978 NEI Africa was formed from the merging of two South African companies, Clarke Chapman Africa and International Combustion Africa. Reyrolle Parsons of South Africa joined NEI Africa in 1980. The group also owned Power Engineers, a transformer manufacturer in the Cape, with Yorkshire Transformer origins, which was acquired by Reyrolle in 1974; Cutler Hammer, the US motor control company, which was acquired in 1986 on the withdrawal of US businesses from South Africa; and Bonar Long, a transformer company set up by the British company of the same name early in the 1960s, which was bought in 1996.

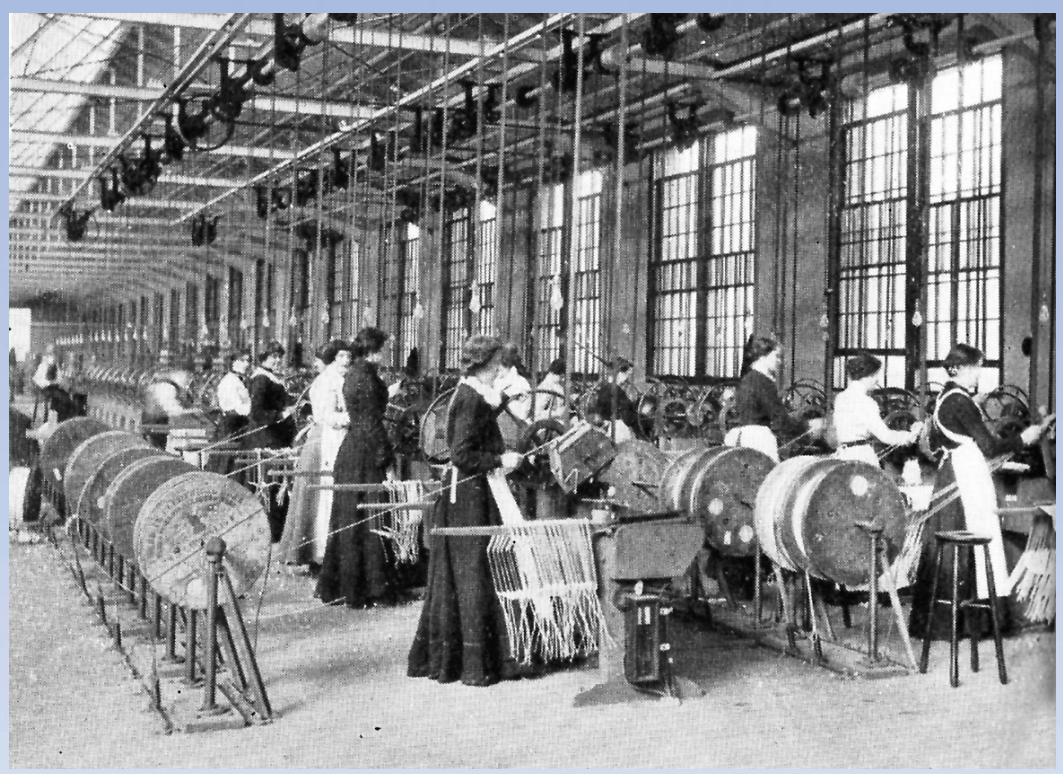
Also eventually included in the NEI group was John Thompson Africa, the country's leading supplier of industrial boilers. Based in Cape Town, John Thompson had set up operations in South Africa in 1954 and today has an installed base of over 3 500 in-

The Cape Town offices of British General Electric at the beginning of the century.



In 1903 British General Electric established an office in Johannesburg.

August 3 1901, the ceremonial laying of the foundation stone at the Trafford Park works of Westinghouse Electrical and Manufacturing Company. The ceremony was performed by the Lord Mayors of both London and Manchester.



By the end of 1902 manufacturing started at Trafford Park in the UK. Seen here are women winding coils in the G aisle of the factory.

dustrial boilers in southern Africa.

Over the years most of these fine, reputable companies would be gathered into the local ALSTOM group - but there were many South African additions too, the most notable being First Electric Corporation.

In 1935 a local entrepreneur, Louis Jacobson, started a small electrical works, the Alpha Electrical Company, to recondition electrical machinery. This grew rapidly with the advent of World War II and in order to meet this growing demand Jacobson registered a new company in 1941, Alpha Harris Engineering, essentially for the manufacture of new electric equipment, rather than repairs. The major product range was electric motors, generators and alternators.

Further demand resulted in the establishment in 1945 of First Electric Corporation with a factory at Knights, incorporating Alpha Harris Engineering.

In 1946 Sir George Bailey of Metropolitan Vickers visited South Africa with the brief to establish local manufacture here. Initially he bought an existing business, LH Marthinusen, which was well established in repairs, but he found it unsuited to the production of electrical equipment. He later met up with Jacobson and a deal was struck whereby LH Marthinusen was sold to First Electric Corporation for a controlling interest in that business, and First Electric Corporation was licensed to manufacture Metropolitan Vickers' products such as motors, transformers and medium voltage switchgear.

This was the single most important step in the establishment of the power electrical manufacturing industry in South Africa, and was to place First Electric Corporation as the centre-piece when the group's power engineering interests were reorganised and restructured some twenty years later.

The ALSTHOM group of companies, including many important subsidiaries and associates such as MAN Energie, SPRECHER Energie and Cegelec, really only made its presence felt in the South African market after World War II and maintained a low local profile throughout, electing not to operate any subsidiaries or branch offices in the country. Instead, its routes to market were via a few carefully selected representation companies, backed up by strong direct marketing from France, Germany and Switzerland.

The ALSTHOM/MAN/SPRECHER partnership was highly successful in South Africa and provided competition to GEC and all others in the field of power generation and high voltage switchgear. This situation was to continue until 1989 when GEC and ALSTHOM were merged into a single entity.

THE EARLY YEARS

Towards the end of the 19th century, South African interest in electricity grew from seeing it as a curiosity to realising its potential as a promising commercial entity. A growing number of companies realised that there was money to be made from electricity and they were already offering a useful range of equipment by the 1880s.

South Africa was not slow to recognise the value of this new power and embraced electric lighting as soon as it became available. The first recorded use of electric lights in South Africa was in 1879 in Cape Town, where a display of "electrical illuminary art" was mounted. A second demonstration took place when the steamship Trojan, equipped with electric lights, docked in Cape Town in 1880. Electric lights were installed in the Cape Town railway station in 1881, and a year later arc lights in the Table Bay harbour and lights in Parliament House added to the Cape Town achievements. Also in 1882, Kimberley achieved a notable first when, on September 2, streetlights were installed and switched on. These lights were the first to be installed in the southern hemisphere, and Kimberley was well ahead of London, which still used gaslights at that stage.

Electricity had arrived in South Africa at a time when it was most likely to succeed. In the northern hemisphere, gas lighting was well established and it was not easy for the new electric lighting to gain a foothold. After diamonds and gold had been discovered, several South African towns considered lighting and chose electricity in preference to gas. Municipalities and industrial users, such as they were, generated their own power and GEC group companies, particularly Metropolitan Vickers, were very successful in supplying generating sets to the mines, municipalities and industrial users.

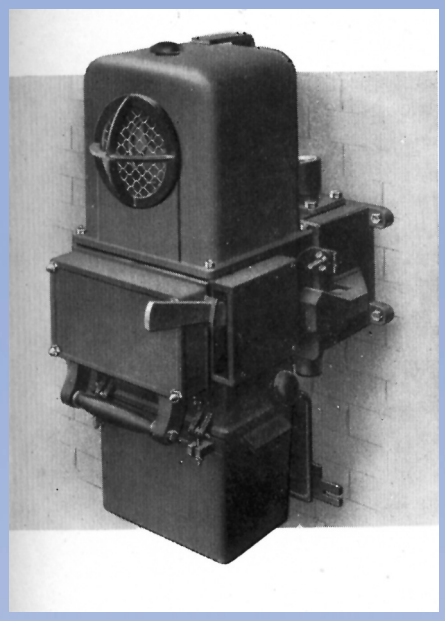
South Africa's municipalities first generated and distributed electricity in this order:

1890 Kimberley
1891 Johannesburg
1892 Pretoria
1895 Cape Town
1899 East London
1900 Bloemfontein
1906 Port Elizabeth

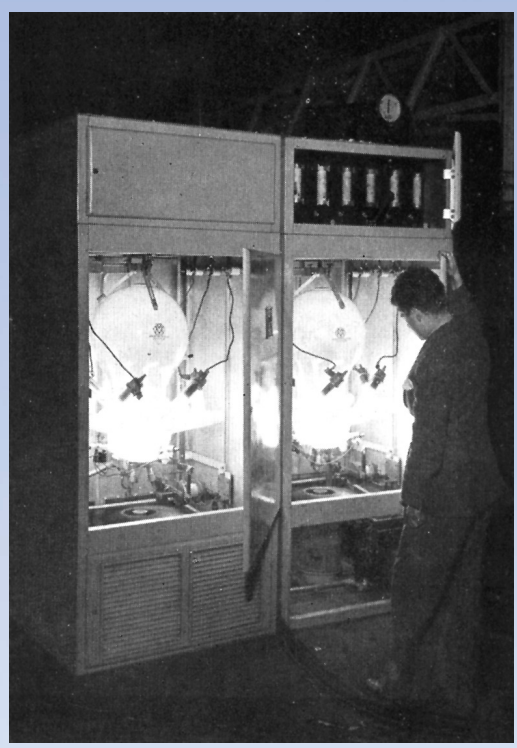
The first power plant supplied by GEC was at Uitenhage in 1908, with an order of two diesel-driven 90 kW electric generators and switchgear. Within a few years, power stations in three other towns - Oudtshoorn, Queenstown and Stellenbosch - had placed similar orders, and in 1910 one of the first hydroelectric stations in South Africa to be equipped with GEC plant was commissioned at Ceres. All of the equipment was imported from the UK with local engineering expertise focused on the construction, commissioning and servicing of power stations.

The legendary discovery of the Witwatersrand gold reef outcrops by George Harrison in 1886 was an event that affected the lives of many millions of people throughout the world, and still continues to do so today. It also profoundly affected the lives and fortunes of many companies who designed and supplied equipment and engineering solutions to the burgeoning mining industry in South Africa, an industry that was to become the cornerstone of the country's economy for the next 110 years.

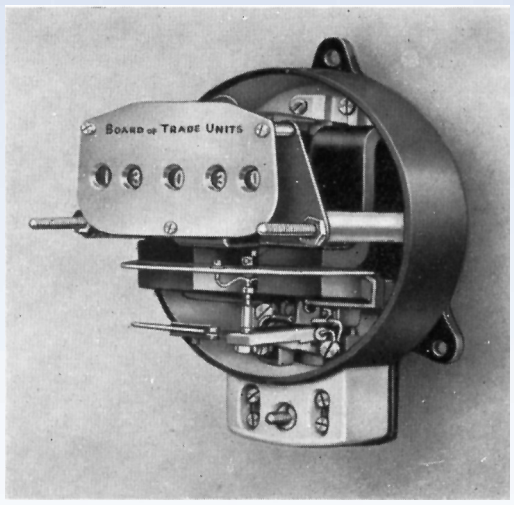
The earliest extraction of the gold-bearing ore from outcrops was achieved by manual labour



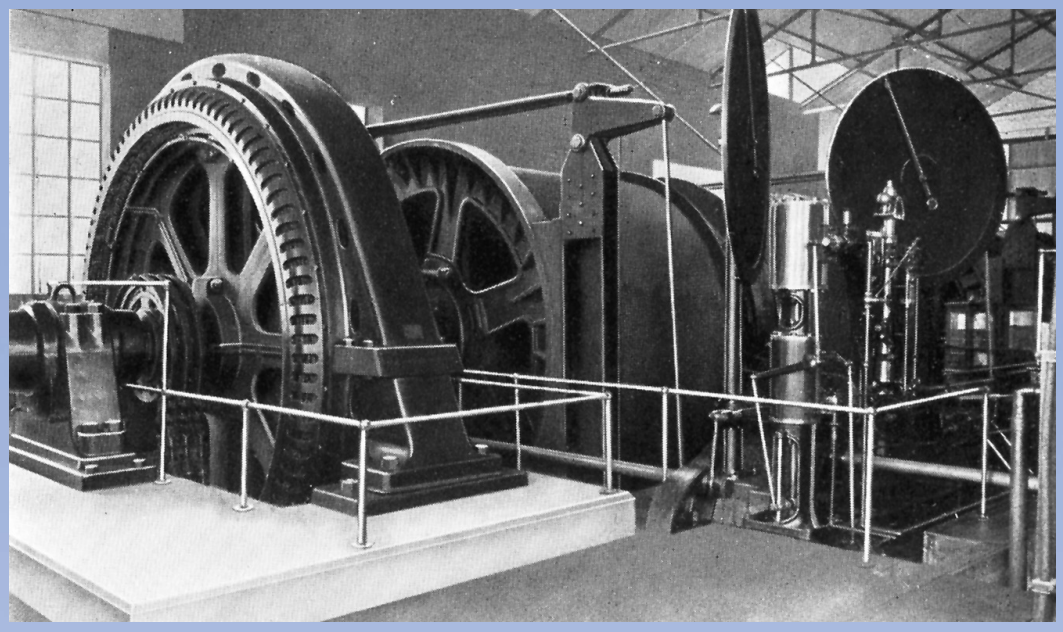
Drawout mining gear of 1909 - a flame proof switch, type S.



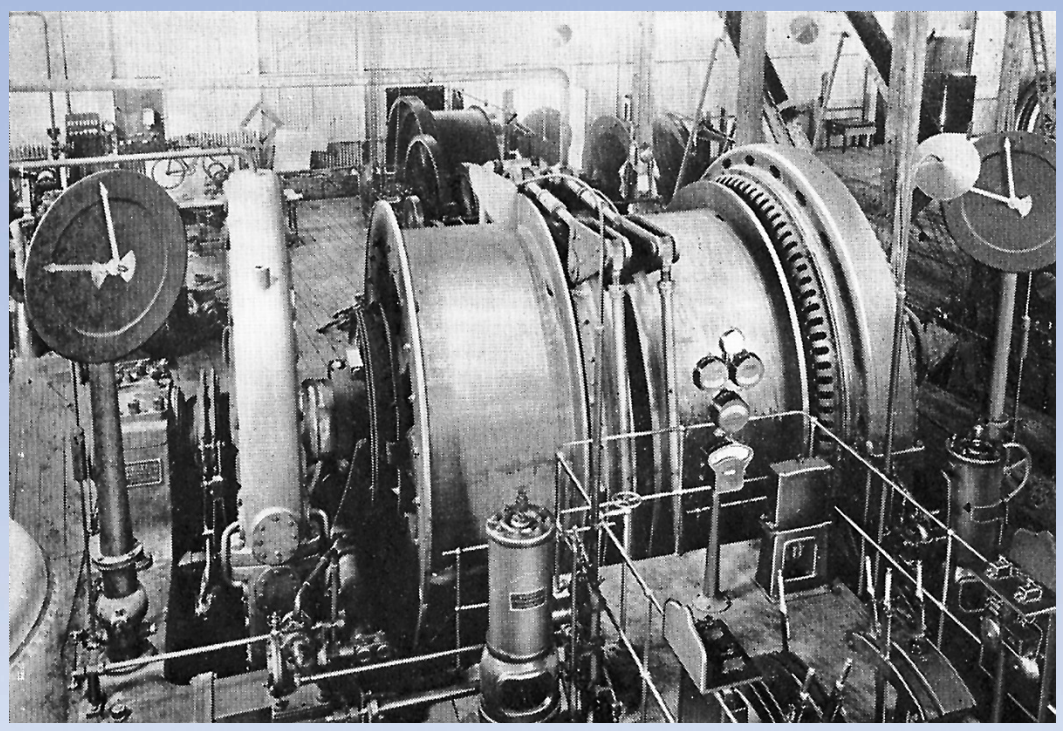
Testing mercury arc rectifiers for the Pretoria trolley bus supply system.



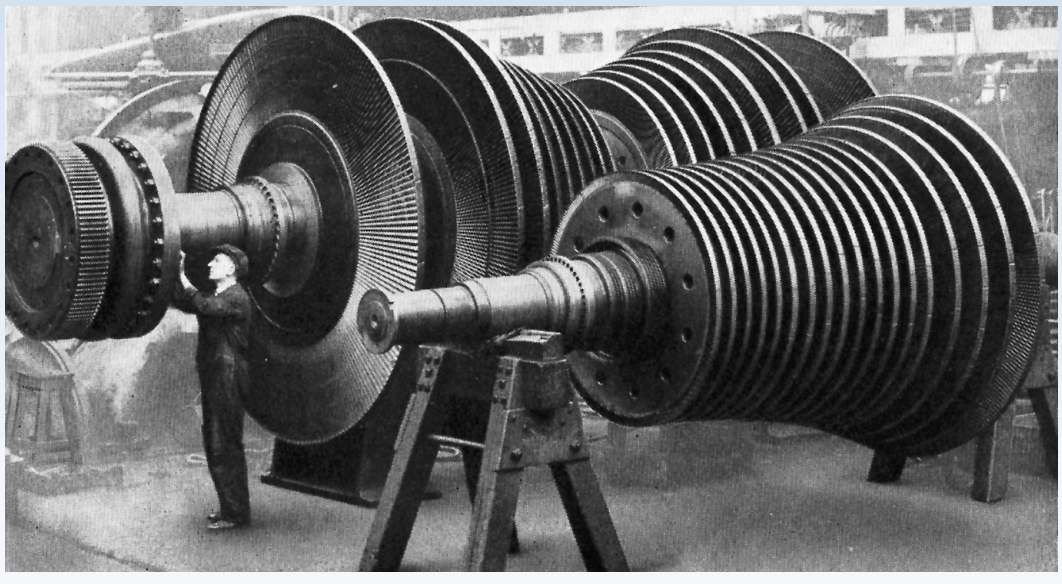
A commutator type ampere-hour meter.



A 1500-hp a.c. winder motor supplied by Metropolitan Vickers, used in early mines on the Witwatersrand.



A bigger 1600hp motor supplied by Metropolitan Vickers, driving a double drum winder used at City Deep gold mine.



Intermediate and low pressure turbine rotors developed in the 1930's.

and various forms of machines, but, as underground mining became a necessity and the depths and loads increased it was quickly realised that high-powered driven hoists would be required to raise the ore, and men and materials. Initially, steam-driven hoists, or winders as they became known in South Africa, were used, but the benefits and simplicity of electrical drives rapidly gained favour in the early 1900s and this created important new markets for the newly formed electrical engineering companies of the UK and Europe.

As the gold-mining industry recovered from effects of the Anglo Boer War, an adequate supply of cheap power became essential. Mines such as Randfontein Estates, Kleinfontein and East Rand Proprietary Mine (ERPM) built and ran their own power stations while companies such as the Rand Central Electric Works at Brakpan and the General Electric Power Company at Driehoek supplied several other mines.

But it was evident that there was a need for large-scale power generation for the Witwatersrand and the notion of a central electricity undertaking gained the support of businessmen, engineers and others. This culminated in the establishment of the Victoria Falls Power Company Limited (VFP) on 17th October 1906, which was registered in southern Rhodesia (now Zimbabwe). The VFP intended harnessing the power of the Victoria Falls to generate the electricity requirements of the expanding industries of the Witwatersrand and southern Rhodesia, but for technical and financial reasons this idea was abandoned. Three years after the establishment of the VFP, it was renamed the Victoria Falls and Transvaal Power Company Limited. The renamed company was still known as the VFP and based its entire operation on the exploitation of the coal deposits in

the Transvaal colony.

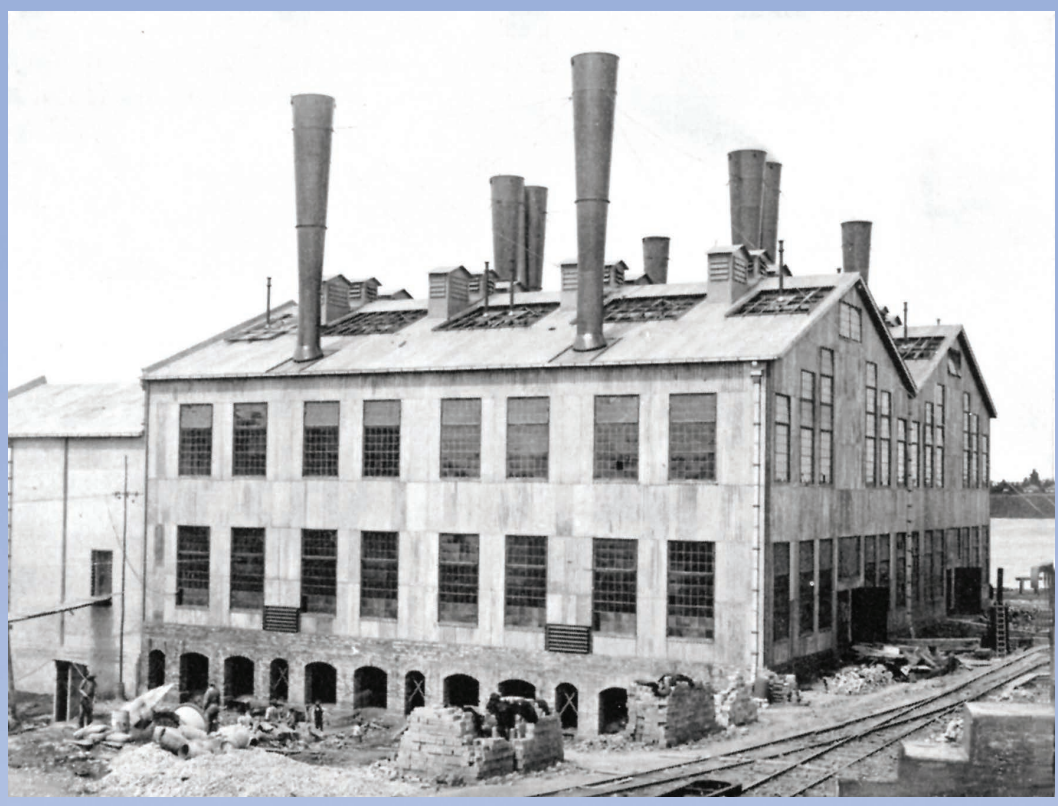
Shortly after the Anglo Boer War, expert opinion recommended that large, centralised power stations would supply more reliable and cheaper electrical power than small, dedicated power stations. The VFP bought out the Rand Central Electric Works and the General Electric Power Co Ltd in 1906 and a subsidiary company, the Rand Mines Power Supply Company, was formed by the VFP in 1908. It supplied electricity and compressed air to the Rand Mines and Herbert Eckstein groups.

By 1915, with Bernard Price in charge of the company, VFP's four thermal power stations, at Brakpan, Simmerpan, Rosherville and Vereeniging, collectively had a total installed capacity of more than 160MW. A system control centre was established at Simmerpan, which today has grown to be the national control centre directing Eskom's entire transmission network.

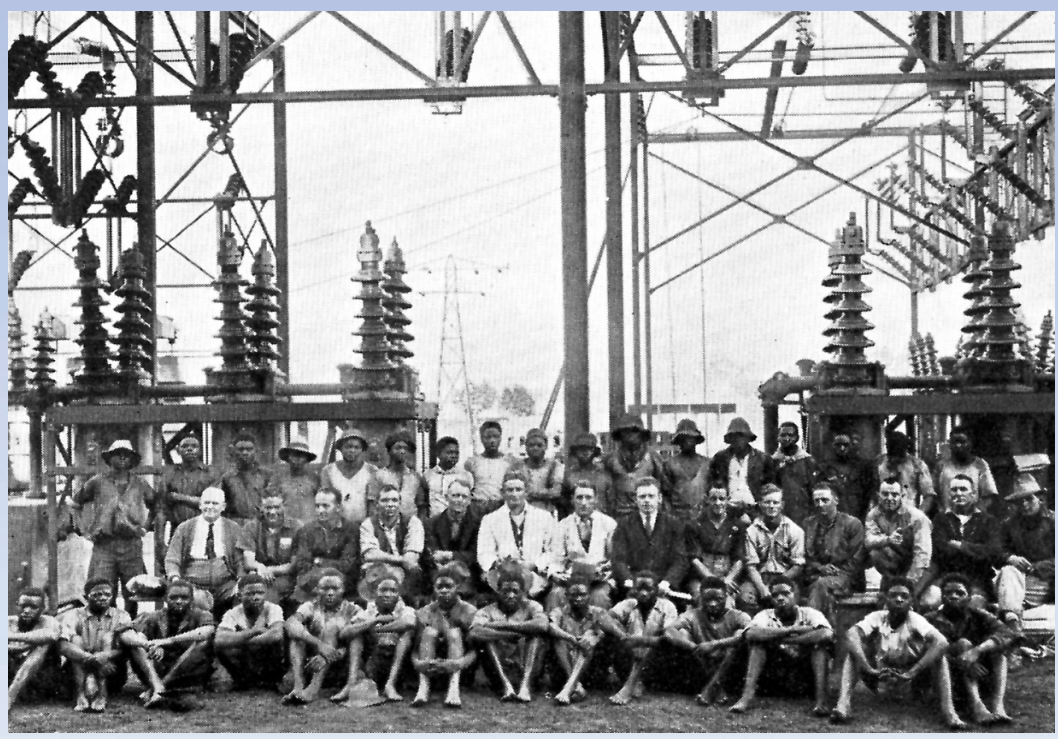
The rapid expansion of the VFP earned it the status at one stage of the largest power supply undertaking in the British Empire. The VFP also pioneered long-distance transmission of high voltage electricity under the severe climatic conditions of the Witwatersrand.

As early as 1904, the administrators of the South African Railways advocated the electrification of the railway line between Springs and Randfontein, and by 1912 the possible electrification of the railway line to Natal was being discussed. The line was to be powered by electricity supplied from a coal-fired power station in Natal - but World War I interrupted these plans.

After the war, having determined that the erection of its own power station was necessary to electrify the lines, the Railways retained



Simmerpan Power Station was erected in 1909 to provide power to the growing gold mine industry around Johannesburg.



66 kV Switchgear with the erection staff on the Mulungushi hydroelectric system in Northern Rhodesia supplied by Metropolitan Vickers.

the services of Merz and McLellan, an eminent firm of consulting engineers based in London. Charles Hesterman Merz, a universally recognised expert in power station design and the electrification of railways, visited South Africa in 1918 and 1919 to assess the country's electrification prospects. The recommendations contained in Merz's report, which was submitted to the government headed by Jan Christiaan Smuts in April 1920, were received favourably and led to the establishment of The Electricity Supply Commission (later to be renamed Eskom) in March 1923 with Dr. Hendrik van der Bijl as first chairman.

General Smuts visits the Alpha Harris stand at the Hall of Achievement, Eskom House, in September 1944. With General Smuts are (from left) Hon. S. F. Waterson (Minister of Economic Development), Louis Jacobson (Works Director, Alpha Harris), Norbert Erleigh (Chairman, Alpha Harris and Chairman, New Union Goldfields), Barney Jacobson (Director, Alpha Harris).

Alpha Harris: Winding low voltage motors at the Booysens factory, 1942.

The Electricity Supply Commission was responsible for establishing and maintaining electricity supply undertakings on a regional basis. Electricity was to be supplied efficiently, cheaply and abundantly to government departments, railways and harbours, local authorities and industry. The Commission met for the first time on March 20 1923 in Cape Town and among matters demanding its early attention were:

- The electrification of the Cape Town suburban railways;
- Taking over from the Railway Administration the Colenso power station and traction sub-stations being constructed in order to electrify the Glencoe to Pietermaritzburg rail link; and
- The establishment of new power stations at Cape Town, Durban, Sabie and Witbank.

In 1925, Eskom obtained four power supply licenses and the Cape Town, Witbank, Sabie and Central Natal undertakings were established. A year later, two coal-fired power stations, Colenso and Witbank, were commissioned. The construction of Witbank power station was achieved by an agreement between Eskom and the VFP, brokered by Merz, in terms of which Eskom was to finance and own the power station that the VFP was to design, build and operate. The VFP agreed to transmit all surplus electricity capacity to the Witwatersrand.

Two years after that, Congella and Salt River coal-fired power stations were commissioned.

Despite the serious consequences of the economic depression in the late 1920s, Eskom's electricity sales increased although, for a time, the expansion of the power supply system was delayed. However, the discovery of new gold fields to the west of the Witwatersrand and a rise in the gold price brought new life to the electricity supply industry.

The available mine winder reference list of the Metropolitan Vickers at Trafford Park, Manchester, records that the first South African order was placed on February 23 1924 by Crown Mines Limited for No 15 Shaft, and that this was a direct-coupled DC Ward Leonard Drive rated at 3 240HP RMS.

The early history of the South African mining industry can virtually be traced from these Metropolitan Vickers winder reference lists, with the names of all the mining hous-

es and their now famous mines such as City Deep, ERPM, Simmer & Jack, Crown Mines, Sub Nigel, Randfontein Estates and all the others listed amongst the UK coal board's miniature winders and those for the Zambian Copperbelt.

Throughout the 1930s and early 1940s Metropolitan Vickers received orders for two or three winders per month from South Africa and, after a decline during the war years, monthly order intake increased to four to six winders per month during the late 1940s and 1950s, with the majority being delivered to the new West Wits mines of Venterspost, Libanon and Blyvooruitzicht and the far East Rand mines of Vlakfontein, Sallies and Van Dyk GM, where depths of wind were now reaching down to 6 250 feet.

Eskom anticipated the rapidly growing demand for electricity from the gold mines on the Witwatersrand, realising in the 1930s that a larger power station than those existing would have to be erected. The construction of Klip power station, situated near the town of Vereeniging, was completed and the station was in operation by 1940.

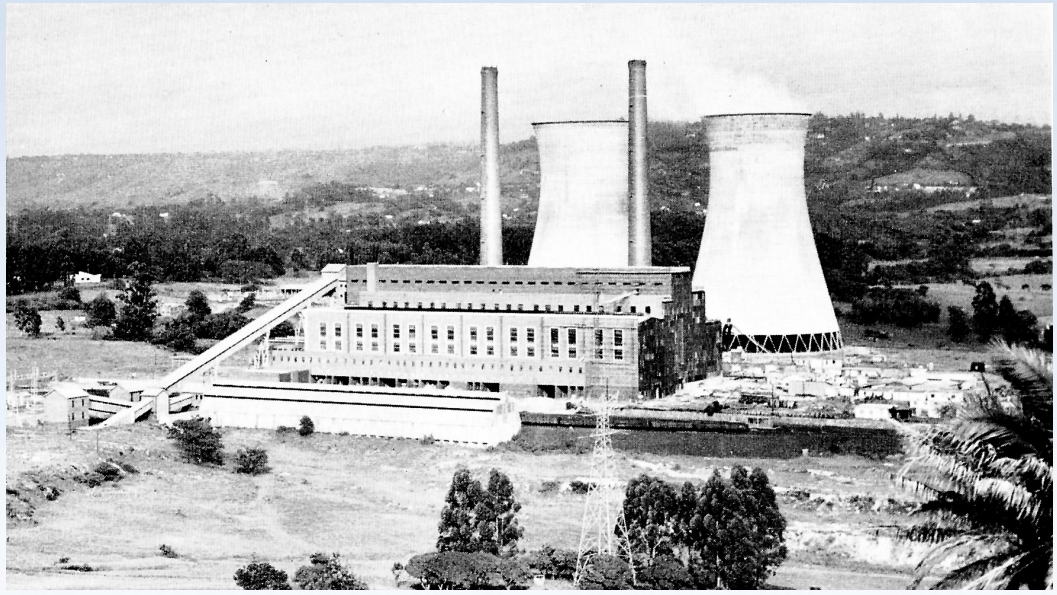
Klip station was powered by 12 x 33MW generator sets supplied by Metropolitan Vickers. As had happened at Witbank, Eskom was to finance and own Klip power station and the VFP was to operate it as part of its own network. Two of Klip's twelve generating sets exceeded the entire capacity of Witbank power station.

During 1947/48 Eskom took over the running of a number of stations and purchased outright other stations, all of which resulted in the establishment of a number of regional undertakings.

Eksom's founding chairman, Dr

Alpha Harris: Transformer coil winding production dedicated to the war demand at Selby factory.

Alpha Harris: Consignment of motors and generators being prepared for shipment to support the Allied war effort.



Umgeni Power Station in Natal, supplying most of Durban's power up to the late 1920's.

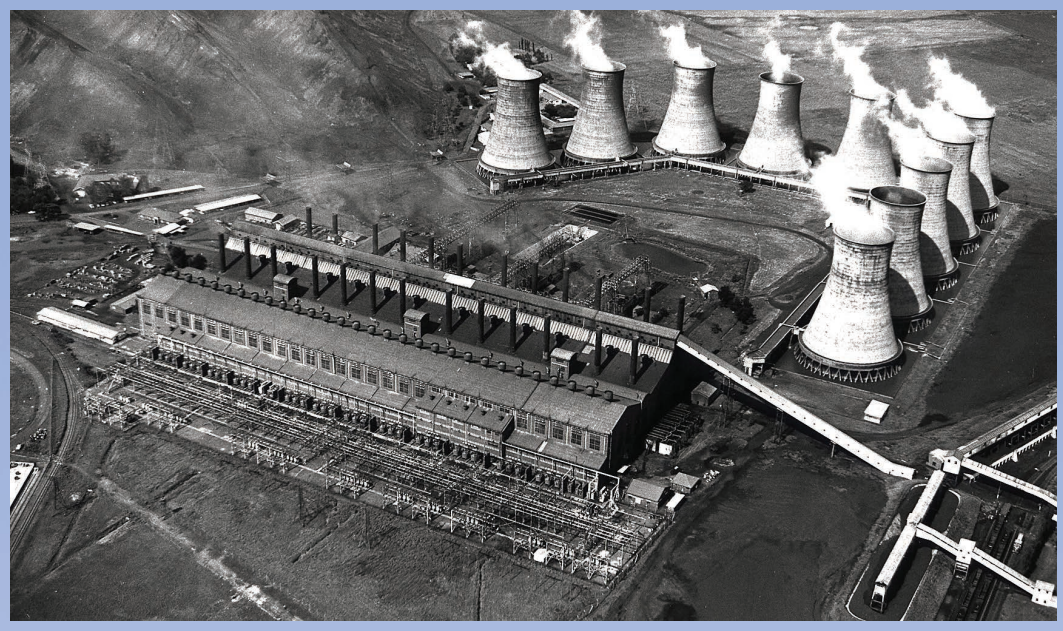
HJ van der Bijl, died in December 1948. At the helm of Eskom for 25 years, since its inception, Hendrik van der Bijl had made an enormous contribution to the electrical engineering industry in general and the power generation sector in particular.

In 1948, after over 40 years of faithful service to the mining and other industries on the Witwatersrand, the VFP was taken over by Eskom. Among the staff at VFP was a young engineer named Tony Charles who, in later years, was to play a prominent role in the electrical engineering supply sector, first with English Electric and later with GEC South Africa.

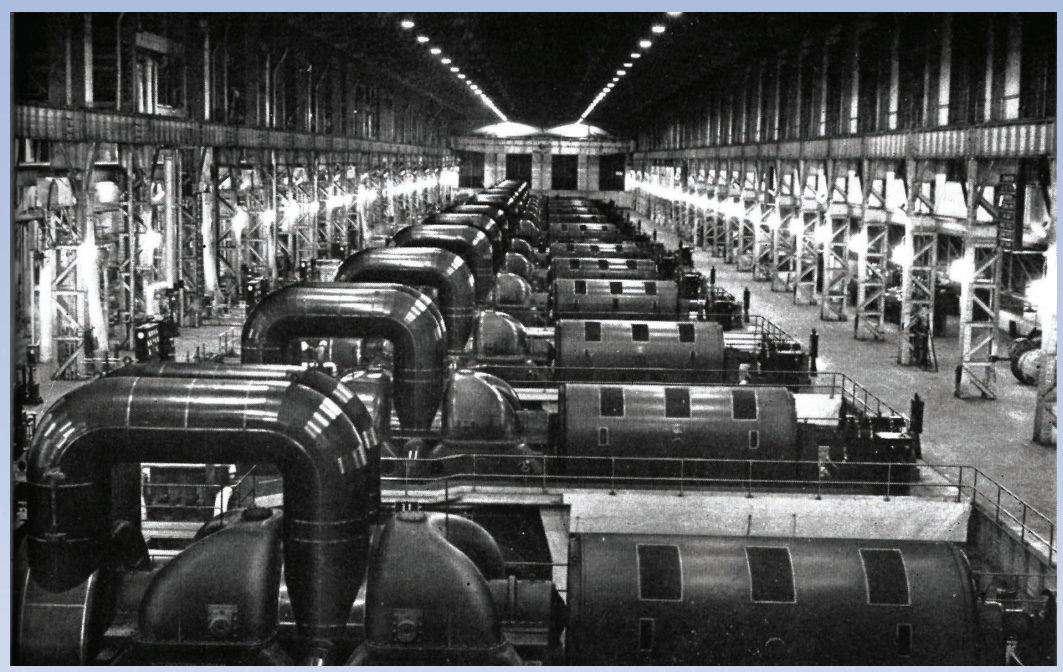
In 1903 the first consideration had been given to the electrification of the railway system in the Witwatersrand area, but it was not until about 1907 that the first attempts were made to actually do anything. Discussions continued until World War I intervened and nothing more was done until 1922. By this time the Merz and McLellan report had been implemented, and by 1926 a full electrical service was in place between Ladysmith and Escourt, and between Pietermaritzburg and Glencoe Junction.

Once the electrification of the Railways was started, developments progressed at a rapid pace in the Western Cape, Natal and Western Transvaal. Initially, 3Kv systems were used with power feed from overhead catenary conductors. 25Kv AC power supply was later introduced and this was increased to 50Kv AC on the Sishen-Saldanha electrification project for Iscor.

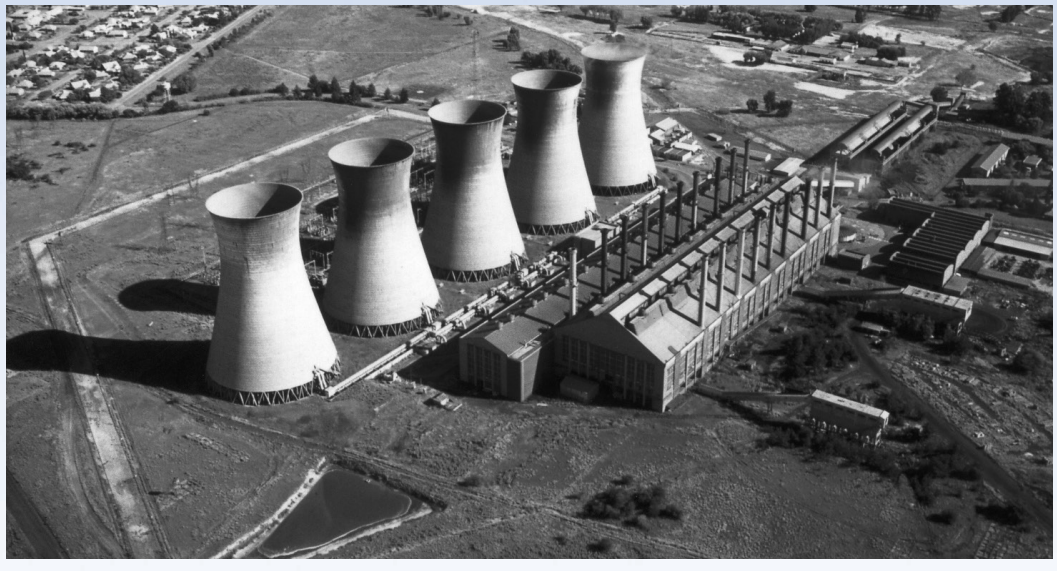
South African Railways' first electric locomotive, a Class 1E, was supplied by Metropolitan Vickers in 1925 and commissioned on the Ladysmith-Escourt line later that



At 424 MW, mighty Klip was the largest power station in the Southern Hemisphere in 1939 and a magnificent showpiece of pre-war engineering expertise.

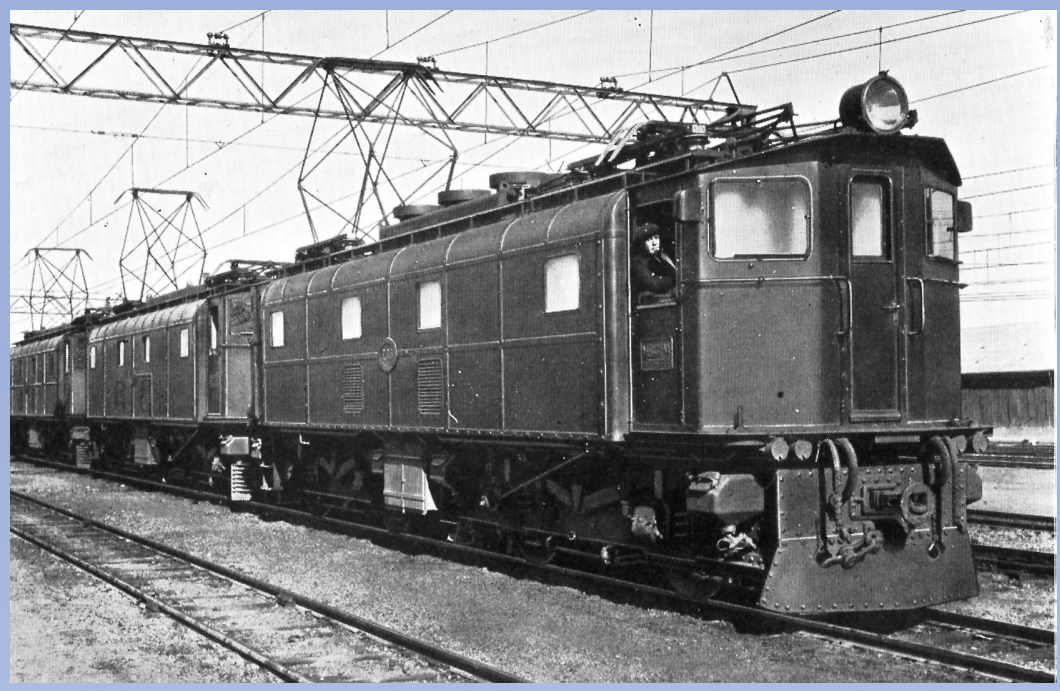


The twelve 33 mw Metropolitan Vickers axial flow turbine generators installed at Klip.

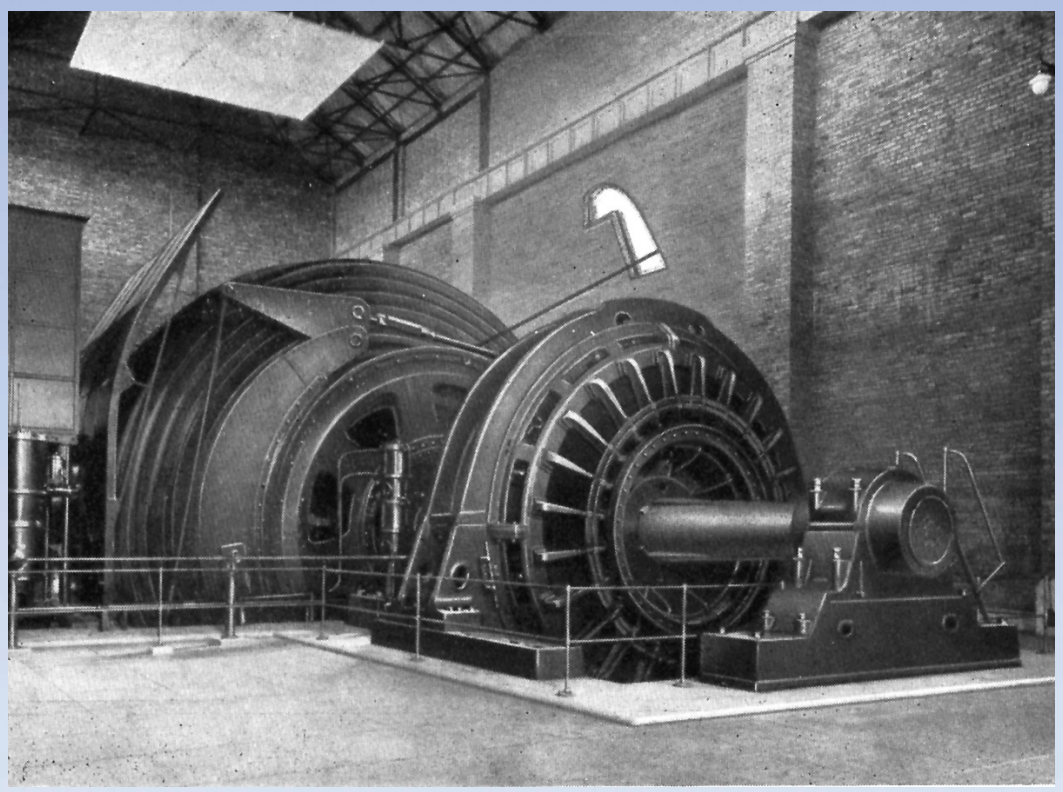


Vierfontein Power Station, was the second power station constructed after World War II. Commencing 1953, English Electric supplied, installed and commissioned twelve 30 MW turbine generator sets to Vierfontein. The station was decommissioned in 1990.

year. This event coincided with the establishment of the South African branch office of Metropolitan Vickers. From 1925 to 1960 GEC Group companies supplied South Africa's total requirement of electric locomotives, all of which were imported from the UK. In later years, First Electric Corporation commenced manufacture of electric motors for suburban coaches but it would not be until 1958 that plans would be in place to manufacture electric locomotives in South Africa.



The 3600hp 3000V Class 1E locomotive was the first electric locomotive to be commissioned by the South African Railways.



In 1928 this d.c. winder at City Deep, supplied by Metropolitan Vickers, was the largest winder in the world at 12 500hp and stayed the largest till 1950.

THE INDUSTRIALISATION OF SOUTH AFRICA

Although very little electrical equipment was manufactured locally prior to World War II, the advent of war created a new and increasing demand for certain types of equipment to support the war effort while capacity in factories abroad reduced as manpower was redeployed. South Africa was called on to assist, and established facilities to produce or adapt needed plant, particularly rotating machines.

During the war years, though, the vulnerability of being fully dependent on overseas sourcing of adequate supplies of new plant and machinery for ongoing development was highlighted. Technology was becoming very much easier to transfer, which encouraged the move towards the local manufacture of transformers, motors, switchgear, etc., with overseas industrialists becoming increasingly aware of the potential for tertiary industry in the country. The pattern of "technology transfer first and local Research, Development and Engineering (RD&E) later" was uppermost, and is still to be found today in many electrical engineering companies in South Africa.

South Africa's raw materials were in strong demand on world markets during the post war reconstruction phase, resulting in high growth in the mining sector – notably gold mining, but including other minerals. Substantial deposits of gold were discovered in the Orange Free State, leading to the development of many new mines in that area, with Welkom, a new town established in 1948, serving as the centre of the new gold boom. Some years later a number of new even larger gold mines were developed on the far West Rand around the Carltonville area. The gold mining industry had entered a period of massive expansion but at the same time the industry had to confront major technology challenges: gold mining operations were moving further away from the cities and going ever deeper – deeper than levels anywhere else in the world. Demand for all types of electrical equipment, particularly sophisticated mine winders, was enormous -as, indeed, was the thirst for increased electrical power supply.

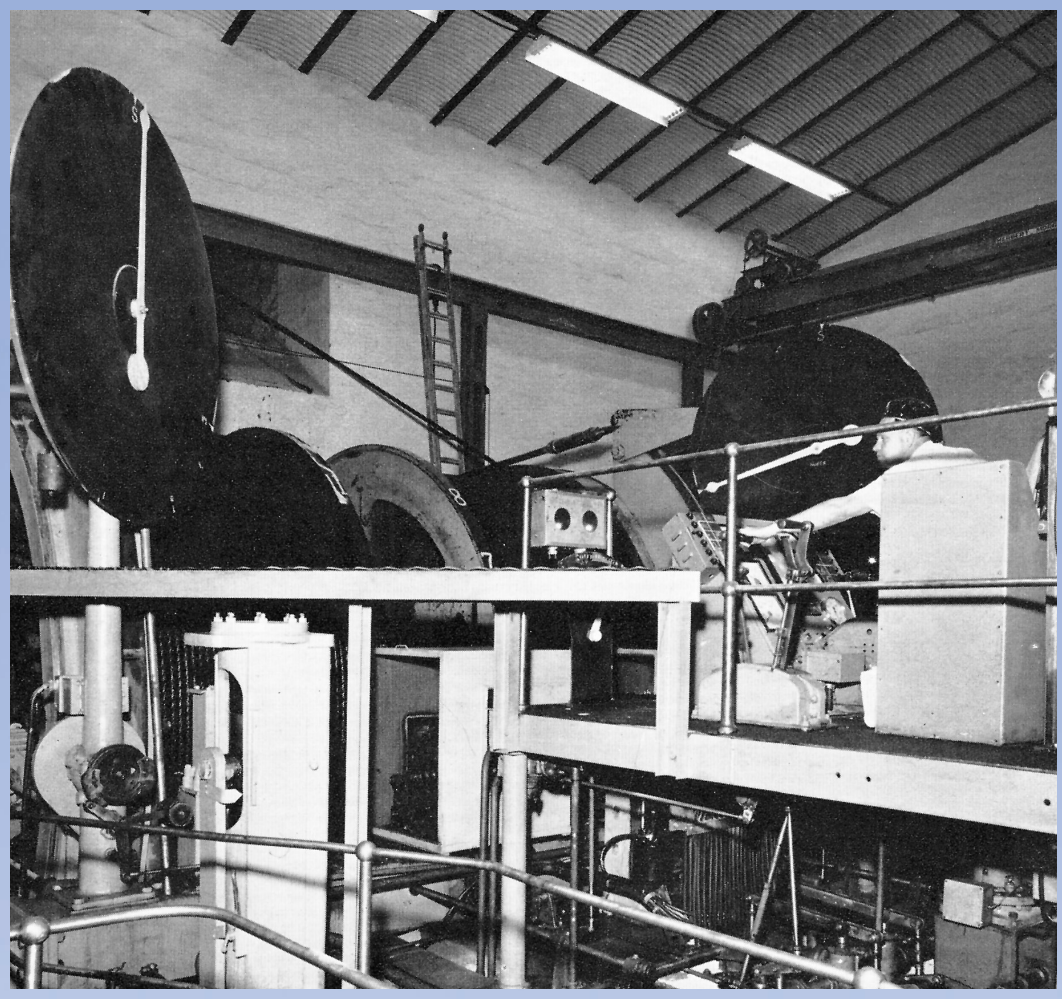
The 6600 hp double drum winder at Hartebeesfontein on the far West Rand, hoisting skips of 15 ton capacity at the mine's No. 2 shaft.

Soon after the war, Metropolitan Vickers established a new division whose business was to provide on-site inspection, servicing and safety audits of mine winders that the company had supplied. This new service was readily accepted by the mining industry and the new division become a significant business, later becoming Field Engineering Services Division which, at its peak, was providing regular inspection service and safety audits on more than 400 mine winders which the GEC group had supplied.

The Free State Gold mines started up in 1946, which resulted in enormous orders for mine winders. Anglo American started the ball rolling by placing orders with Metropolitan Vickers for 14 DC Ward Leonard winders and eight AC geared winders in a single contract. Many of the machines are still working today, nearly 60 years later. This was followed up by further orders for nine AC geared winders in 1949/1950 for Western Deeps, Western Reefs and the Free State Geduld, and interspersed with many other similar orders from all the other South African mining houses – Rand Mines, Gold Fields, Anglo Vaal, JCI and Union Corporation. To support the development of these new Orange Free State mines, Eskom engineered a com-

prehensive HV distribution system for which English Electric supplied 9 x 90 MVA transformer banks plus 2 x 40 MVA synchronous condensers, which were installed at Virginia.

Surprisingly, orders from South African gold mines slowed to a trickle of ones and twos during the 1950s. This was clearly the period when many shafts from surface were being brought into production, but it also saw the start-up of some new mines such as Buffelsfontein and Hartebeesfontein in the far West Rand and Virginia, Merriespruit and Saaiplaas in the Free State, before the next wave of sub-vertical shafts were started in the 1960s. Metropolitan Vickers, however, was still riding the crest of the wave with many winder orders being received from coalmines in the UK.



Due to the increased depth of mines underground winders were installed to help with the capacity, here is a 2300 hp single drum winder installed at No 2A Shaft of Hartebeesfontein Gold Mine.

Winder drive technology changed very little from the 1920s to the late 1950s, with AC geared and DC Ward Leonards, featuring geared or direct-coupled motors, dominating the order book, and improvements coming in the form of dynamic braking and closed loop control systems that clearly improved driver controls, or in moving magnetic amplifiers to rotating exciter sets and amplidynes. The advent of automatic rock winders dawned but, on the whole, the period is punctuated by the many identical repeat orders received from customers, and the priority was clearly speed of delivery rather than technical innovation.

At the same time, shaft depths were increasing in the Free State to depths of 1 400m and the need for greater tonnages was important to improve the economic viability of the mines. This led to the invention of the Blair Multi Rope Winder (BMR) by Robert Blair of Anglo American. The BMR attached two ropes per conveyance on drum winders. The first of these winders was installed in 1960 at President Brand mine in the Free State. This was the forerunner of many innovative mechanical and electrical designs of high-powered mine winders, which were, and are still today, the norms for the South African mining industry.

The 1950s also saw the expansion of the South African offices of Metropolitan Vickers, English Electric, British Thomson-Houston and GEC into local centres of technical competence for mine winder technology. The consolidation of Metropolitan Vickers and British Thomson-Houston saw the formation of a single mining department in Rugby in 1958-1959 under the new banner of Associated Electrical Industries (AEI). This consolidation also occurred in South Africa, and sharpened competition with the other main British electrical company, English Electric. In the South African marketplace, all mine winder projects were hotly contested between these two main players, with GEC and the European manufacturers having limited success.

Soaring demand for power from the rapidly expanding mining industry and industrial growth posed a serious challenge to Eskom in the post-war period. Electricity consumption had to be restricted to avoid injury to the national grid and every effort was made to obtain additional generation and transmission equipment. Generating capacity doubled between 1945 and 1955, and Eskom estimated that over the next 10 years capacity would have to be doubled again.

With a cheap and abundant supply of coal, Eskom, as the major supplier of power to the mines,

grew rapidly, while increased interconnection allowed for even larger generating unit sizes to be considered. Large municipalities such as Johannesburg, Pretoria, Cape Town and Port Elizabeth continued to build their own power stations, but the days of own-generation were numbered as interconnection through high voltage transmission brought Eskom an economy of scale with which the municipalities could not compete.

Industrial growth was not confined to the mining industry, however, and was followed very soon by secondary industries such as steel making, pulp and paper, the chemical industry and the smelting of non-ferrous metals.

Initially, the major thrust for local manufacture was to achieve import replacement and this was a role industry undertook. An ongoing and secure supply of equipment was necessary for the development of the country and there was a need to shorten lead times and supply routes. The risk associated with imports had already been highlighted in the war years when traditional sources had failed. In order to encourage this move to localisation, a level of protection was introduced: government applied import duties and quantitative quotas, and preferences for local content were often allowed in the adjudication of tenders.

First Electric Corporation, with its local manufacturing facilities already developed during the war years plus its technology links to Metropolitan Vickers, was ideally placed to meet the market's growing insistence on local manufacture, service and back-up. English Electric recognised these new market demands and responded by building a new factory at Benoni in 1948. The Benoni factory was the first-ever built by English Electric outside the UK and represented a clear acknowledgement that the South African market for electrical equipment would increasingly have to be supplied from local resources, both physical and human. Initially, the Benoni works was mainly engaged in assembling imported components for a wide range of products for a very hungry local market. Management's attention was focused on increasing local content and introducing full local manufacture as fast as possible to increase capacity and shorten delivery times. Similarly, while local design and development efforts were initially concentrated on adaptive engineering of transferred technology, in later years many completely new design and development projects were undertaken.

Perhaps the most successful of these grass-roots development projects was one aimed at reducing the cost of distributing low voltage power in residential and industrial areas. Previously, this service was provided through expensive-to-build brick-walled distribution substations that, because of their size, had to be sited well away from vehicle and pedestrian traffic. English Electric's new product was a small, rugged, tamper-proof compact substation they named the MinEEsub. Some fast commercial footwork resulted in the company obtaining a registered trademark on the MinEEsub name. It was small – 600mm wide x 1 500 mm high – and could be mounted on pavements without disrupting pedestrian or vehicle traffic. By the end of 1962 the MinEEsub had been fully tested, and it was ready for the market in 1963. Johannesburg Municipality placed the first production order and it was an immediate success. Needless

An exhample of a John Thompson Africa industrial boiler installed in 1950.

to say, other municipalities rapidly accepted that which was good enough for Johannesburg and converted to this cheaper, more flexible method of distributing low voltage power. In June 1968 English Electric delivered the 1 000th MinEEsub – barely five years after bringing the product to the market. The MinEEsub was an outstanding success.

Other manufacturers entered the market for minisubs and many product variations were introduced but the GEC group, after it included English Electric, had established a very strong market position, later to be reinforced with in-house manufacture of ring main units.

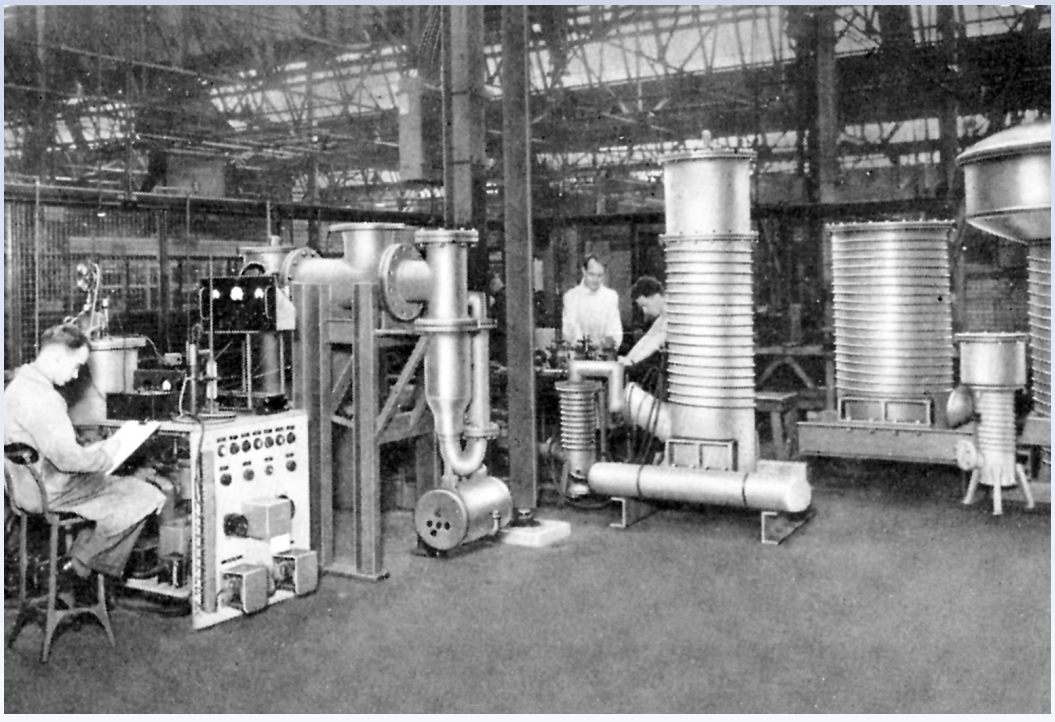
Building and equipping factories was all well and good, but attention also needed to be directed to the development of the group's growing number of people at all levels. Young South Africans had to be identified, recruited and trained, particularly in the technical skills, to form the backbone of the future management structure and truly root the group in South Africa rather than continuously rely on the services of expatriates.

Metropolitan Vickers had a long-established and highly successful post-graduate training programme, later adopted by AEI and English Electric. The programme offered selected graduates from Commonwealth countries two years' practical training in UK factories where the young engineers were exposed to the company's products and core technologies. The intention was to ensure these engineers returned to their home countries and in due course become either part of the local group or acted as ambassadors in the customer businesses they joined. Those chosen for the programme were never to forget such a fine opportunity to experience the breadth of engineering activity in the UK. This scheme ran from 1923 until it was closed down in the late 1960s, having proved highly beneficial in business terms, fostering long-standing loyalty that encouraged networking both locally and overseas.

Training and development programmes were not solely directed at graduate engineers. Technician training programmes were implemented, working with local Technikons. Apprentice training programmes were introduced with well-resourced training facilities at Knights and Benoni offering a wide spectrum of trade choices. Other suitably qualified young people who chose non-technical careers were assisted where necessary to advance their studies at academic institutions.

Over time these training and development programmes built up a very strong human resource base and provided the group that would become ALSTOM South Africa with much more of a South African flavour and culture than most of its contemporaries.

In 1930 only 364 miles of the rail network was electrified but this increased rapidly reaching 2015 miles by 1958.



Engineers being exposed to large high-vacuum oil diffusion pumps during their post-graduate Training Programme at Metropolitan Vickers UK.

EXPANSION OF THE SOUTH AFRICAN INFRASTRUCTURE

A major technical innovation in mine winding drive converter technology occurred in the 1950s with the introduction of Mercury Arc Converters, and both English Electric and AEI secured important winder contracts for this new technology. This advance in winder technology allowed for a much-needed increase in shaft outputs, particularly from the greater mining depths on newer mines. A further advantage was gained by developing gearless winders that were electrically coupled to simplify and reduce process costs. Winders steadily increased in size from 2MW to 5MW during the 1960s.

The takeover of AEI by GEC in 1967, and merger with English Electric in 1968 - which are dealt with in more detail further on - caused considerable confusion in the mine winder business units of the newly founded GEC company. Various rationalisation and reorganisation moves took place both in the UK and in South Africa. The period from 1969 to 1973 was particularly difficult for the South African business and several key employees left the company, some of them to establish competing businesses. This period also saw a significant decline in the demand for new winders as various mines were consolidating their infrastructures after shaft sinking.

The period from 1968 to 1972 was a very difficult time for the South African mining industry, and this reflected adversely on the mine winder order intake of all companies. Fortunately, AEI had secured several good contracts just before the downturn, and orders from the platinum and copper mines helped GEC through this difficult period. Among these was the noteworthy

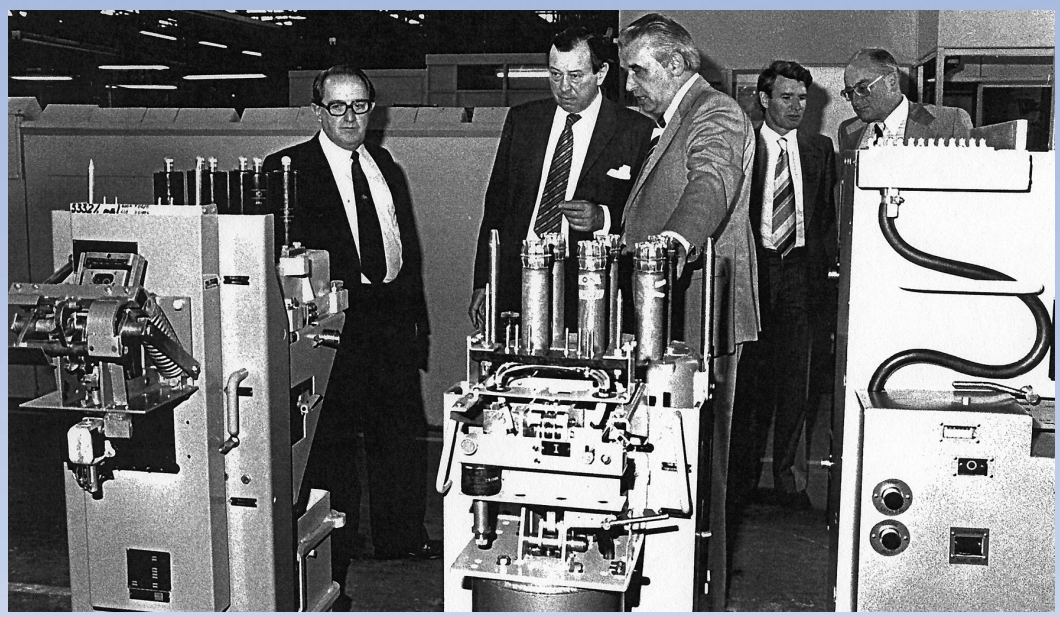
The BMR rock winder at East Driefontein's No. 2 shaft is driven by two 8250 kw DLC 156 motors which were the largest DC motors manufactured for mine winder application worldwide in 1972. The motors were manufactured by GEC Large Machines at Rugby.

Mine winder control panels for English Electric man winders at Kloof main shaft. (1966)

order GEC Mechanicals secured in 1970 for a twin overhung motor, 19'6" diameter Koepe winder for Anglovaal at Prieska Copper Mine in the Northern Cape, and several repeat orders from Gold Fields mines obtained during this lean period. One of the most important contracts secured by AEI at the time was for the electrically coupled BMR rock winder at East Driefontein No. 2 shaft. This winder is driven by two 8 250kW DLC156/62 DC motors, which are the largest DC motors ever manufactured for mine winder applications in the world.

Kloof Gold Mine main shaft with two 8000 hp AEI rock winders and two English Electric 6600 hp man/material winders, they were among the first machines equipped with solid state control systems.

By the mid 1960s, the growth in demand for electricity had risen to a consistent 7% to 8% compounded annual rate which, if it continued, would require doubling the country's entire generating capacity every nine years - a shorter period than was required to build a large power station - and there were no signs of the demand tapering off in the foreseeable future. Eskom rolled out an ambitious power station building programme that was viewed as one of the world's greatest expansion programmes in generating capacity. For suppliers, these were exciting times with enquiries being issued thick and fast for large orders even by international standards.



Lord and Lady Nelson visited South Africa early 1971. Lord Nelson, formerly MD of English Electric, then Chairman of GEC, visited a number of facilities in the South African group. Here Lord Nelson is seen visiting the Switchgear factory at Knights. Seen from left: Ronnie Wearne, Lord Nelson, Arthur Muller, Ian Dorrit and Tony Charles.

Regrettably, GEC group companies were not well positioned to take advantage of these opportunities. GEC had sold its turbine generator business to CA Parsons in 1965, thus temporarily exiting the sector, and although in later years GEC made a strong return through the takeover of AEI and subsequent merger with English Electric, each of whom were far larger in the field than GEC had ever been, the newly regrouped turbine generator business needed time to bed down. Consequently, most of the major

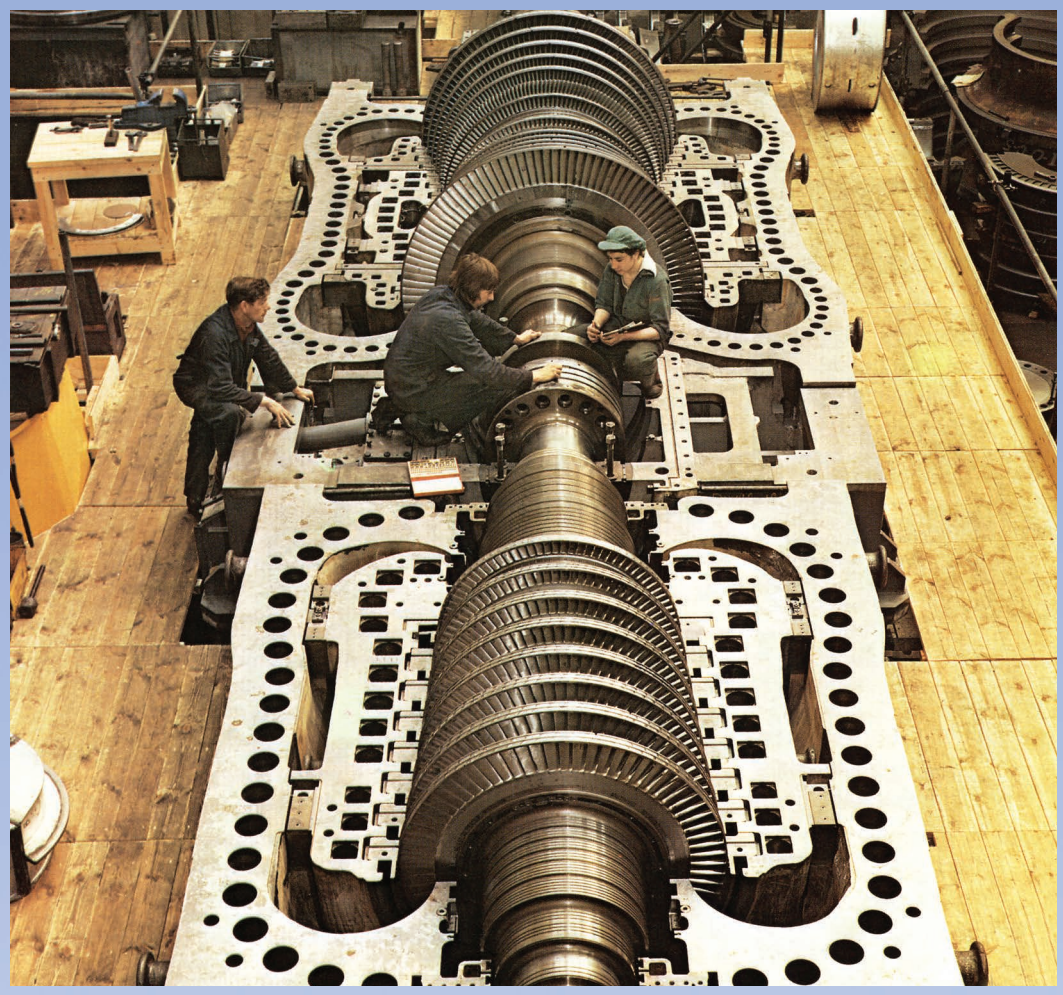
By end 1972 demand for outdoor switchgear had reached such levels that local manufacture became essential to keep up with market demand. The first T3 outdoor ring main unit left the assembly line at Knights in March 1974.

orders placed in the 1960s went to European suppliers, including ALSTHOM and MAN, which secured orders for six 200MW turbine sets for Eskom's Grootvlei power station in 1962/63, two of them being noteworthy as the first dry-cooled turbine generators in South Africa.

As a consolation, when the series of group mergers was complete, GEC South Africa found itself with an installed base of more than 550 UK-manufactured turbine generator units on its inventory, providing a thriving after-sales business that would carry the group in the long, lean period that was to follow.

To cope with ever-increasing demand and a rapidly growing interconnected grid, Eskom now looked for fewer, larger generating units with much higher efficiency, not so much dictated by first cost, but rather by their reduced cooling water requirements and the availability of a coal supplier dedicated solely to the power station. These criteria resulted in the now-familiar pithead power station with no rail access whatsoever and boilers that largely accept anything that comes out of the mine. Sizes of unit adopted now approached the largest of their type in the world, matching western European standards for both boilers and turbine generators.

Eskom's deliberations led to the adoption of the "six-pack" technology standard and the stage was set for what was to become the present shape of South Africa's power generation infrastructure. The first six-pack station was Arnot, with six 360MW units closely followed by Kriel with six 500MW units. The turbine generator contracts for both of these stations were placed with Brown Boveri of Switzerland but, interestingly, most of the equipment was



The first of the six turbines being assembled at Duvha Power Station. When fully commissioned in 1979, Duvha became the biggest thermal station in the world producing 3 600 MW.

Inner stator for Duvha's No 1 Generator arrived in Richards Bay in 1978, its total weight was 268 tones and was transported to Witbank by road.

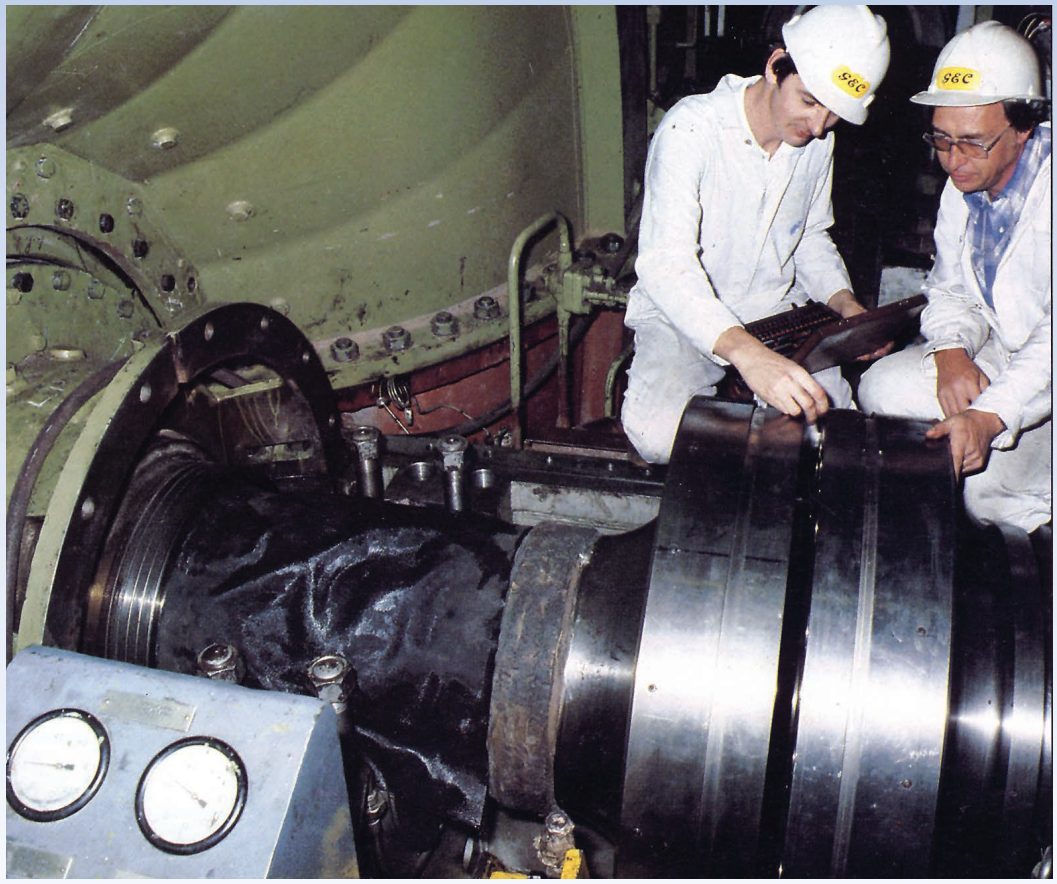
in fact manufactured by Brown Boveri's French subsidiary, CEM, which today is part of the ALSTOM group.

Having had three years to digest its AEI and English Electric components, by the early 1970s GEC was consolidating with a new design philosophy that was no longer solely focused on the requirements of the UK market. The new designs were very much closer to South African requirements and, at the same time, Eskom raised the unit size further to 600MW, bringing it nearer to the UK generator standard of 660MW. GEC was now in a position to submit a seriously competitive tender for a new power station.

In 1972 Eskom placed an order with ALSTHOM/MAN for Matla's six 600MW sets and, having received a number of good offers and conscious that its high growth rate would soon take it back into the market, Eskom decided not to go out to tender the next time, but to re-validate - for other sites - the offers they already had. Six months later, the order for Duvha was placed with GEC - the first major order for turbine generators in the group for 20 years. GEC was back in business.

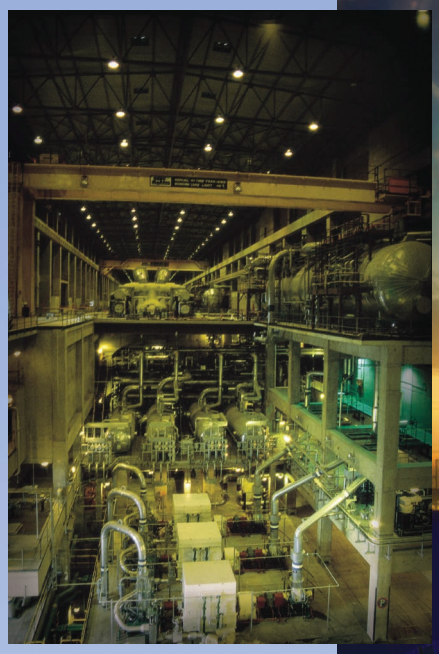
Winning the main order for a new power station went far beyond securing orders for the turbine generator sets; it usually allowed the main contractor to pull through orders for a substantial amount of auxiliary equipment, most of which was locally manufactured. Typically, GEC Machines Division would be called upon to supply very large high voltage machines to drive boiler feed pumps and cooling water pumps, plus literally hundreds of low voltage motors to drive fans, conveyors, pumps etc. A power station order usually brought sub-stantial business opportunities to most divisions in the local group.

Matimba Power Station displays the typical "six pack" Eskom layout. Matimba is a dry cooled station with a installed capacity of 3990 MW. Construction started in 1981. The turbines, generators and boilers were all supplied by ALSTHOM.



Engineers measuring a gap clearance and checking consistency on a coupling between the intermediate and low pressure shafts on a Duvha turbine. (1984)

The grid was rather imbalanced, with the Transvaal and Northern Free State coalfields dictating all the generating capacity within a 150-kilometre radius. Being located reasonably close to the mining load was fine, but Cape Town was some 1 500 kilometres distant, with little in between. Geography thus led to the only departure from coal-based generation in South Africa - the decision to go ahead with a nuclear station at Koeberg, a decision fraught with politics. The major orders were secured by various French companies, with Framatome supplying the nuclear island, ALSTHOM supplying the two 1 000MW turbine generators and Cegelec undertaking the main electrical installation contract. The well-established Framatome/ALSTHOM/ Cegelec partnership had supplied many nuclear stations in France and around the world.



Majuba Power Station with an installed capacity of 4110 MW, construction started in 1983, the first unit went on load in 1996 and the power station was completed in 2002.

In 1979 GEC won the order for Tutuka station and, as had happened previously, Eskom re-validated previous tenders to place the next station order for Lethabo, which was a duplicate of Matla, with ALSTHOM/ MAN.

Grootvlei's dry-cooled units had performed well and, with all this growth at inland sites, cooling water was at a premium. In the meantime, Iscor's coalmine at Ellisras - the only one in the country specifically for metallurgical-grade coal - was yielding a large surplus of much lower-grade coal adequate for generation. This would be available at a good price - but there was no water. Eskom decided to build Matimba power station to exploit this resource with a further "six-pack" to the same specification, but now employing the largest dry-cooling system in the world by far. In 1981 ALSTHOM/MAN won the Matimba contract with a further addition - the boilers going to Stein EVT, another ALSTHOM company.

Once again high projected growth encouraged Eskom to repeat its previous policy of purchasing further stations against the same specification, but two more this time, Kendal and Majuba, both to be dry-cooled. Kendal went to Siemens, and the Majuba contract was placed with GEC.

Majuba was the last power station ordered by Eskom. In a little over 20 years since the order had been placed for Arnot, Eskom had ordered a total of nine "six-pack" power stations plus the nuclear station at Koeberg - a remarkable feat - and the GEC/ALSTHOM/ MAN group of companies had between them secured the greater share of the business.

But building the country's infrastructure was not only about power stations; the entire rail infrastructure needed to be modernised and expanded to meet a growing local economy, and even more rapidly growing exports of raw minerals.

Before the early 1960s South Africa's total requirement for electric locomotives and suburban coaches had been imported from the UK, with GEC group companies supplying all the locomotives. The suburban coaches were supplied by Metro Cammell, which is today part of the larger ALSTOM group.

In 1958 Union Carriage and Wagon (UCW) had been established in Nigel for the local manufacture of rolling stock, building mainline passenger coaches at first, before progressing to electric locomotives and suburban passenger coaches. The electric propulsion and control equipment for the locomotives and coaches was supplied to UCW by a joint venture between AEI and English Electric. In turn, each company split their scope of supply between their factories in the UK and South Africa.

AEI was the nominated leader of the AEI/English Electric joint venture and was managed out of the Trafford Park office in Manchester. The Trafford Park office was assisted locally in their dealings with UCW and the Railways by personnel at the South African offices of AEI (Maritime House) and English Electric (Unitas House). Following the consolidation of GEC South Africa at new offices in Kew, these personnel formed the Traction Projects business unit. As the traction business matured a decision was taken in 1972 that main contractor responsibility would be transferred to Traction Projects Kew, although technical responsibility would remain with the UK operation.

The Orange Express, hauled by two Class 5E locomotives. The first locomotives in the 5E range were fully imported from Metropolitan Vickers in the UK.

The first locally constructed mainline electric locomotive, the class 5E1, was handed over to the South African Railways in January 1963. Between 1963 and 1969 UCW supplied no fewer than 555 class 5E1 locomotives to the Railways. New locomotives, the class 6E and 6E1 were designed, increasing the locomotive power to 2200kW from the 1400kW output of the class 5E1. For these new locomotive the AEI/English Electric joint venture, by this time part of GEC, was again the electrical equipment partner for UCW. The first class 6E locomotive entered service in 1969 and by 1985 over one thousand units were supplied.

The first units manufactured by Union Carriage and Wagon in Nigel incorporating electric traction and control gear supplied by AEI and English Electric, were supplied to South African Railways in 1963. A total of 690 units in the 5E range were delivered between 1959 and 1969 of which 555 where locally manufactured.

As electrification of the Railways network expanded, the need for electric traction equipment and rolling stock grew. The success and competitive nature of the UCW/GEC partnership made it very difficult for competitors to enter the market. After the initially agreed level of localisation in the traction package there was a regular review against each tender and local content was gradually increased. In 1974 an agreement was made with the South African Railways whereby local manufacture would be extended to all electrical equipment that was still being imported. The agreement was that, in quantity, 50% of each item would be imported and 50% manufactured locally. This would entail a major expansion of the local facility at the Driehoek site in terms of manpower, production facilities and knowledge of new and very complex equipment.

The move to consolidate traction manufacture at the Driehoek site started in 1975 with the transfer of the production facilities from Benoni. The Knights traction motor facilities were transferred later, once the main factory building at Driehoek had been extended. GEC Controls, who used only part of the site, had occupied Driehoek previously; a new factory and offices were built over the road from

the Driehoek site, known today as Triangle. Triangle was extended in later years to house the traction control gear manufacture and the railway signalling business unit.

To boost exports of raw minerals from the Northern Cape, a decision was taken in the late 1970s to build a deep water port and bulk handling facility at Saldanha Bay, served by a dedicated 860-kilometre line from Sishen to Saldanha that would allow for the bulk transport of iron ore. GEC was successful in being awarded the contract for the massive class 9E locomotives. These were powered by 3,8MW motors operating at 50Kv in consists of three, hauling 20 000 ton trains that stretched for more than 2 kilometres. A total of 31 class 9E locomotives would be supplied between 1978 and 1986.

In 1981 a decision was taken to consolidate all the group's railway activities in one company, GEC Traction and Signal (Pty) Limited. This company would comprise the traction manufacturing, traction projects and railway signalling business units, and have its headquarters at the Driehoek site. This would mean traction projects and railway signalling moving out of the Kew site, which took place in early 1982.

Expansion of the transport infrastructure was not confined to the rail network and rolling stock. The increased level of import/ export trade was placing a heavy load on the main harbours with serious delays in shipping turnaround time, particularly at Durban. The ports and harbours needed to be expanded and modernised, particularly to handle container traffic. In 1976 GEC was awarded a turnkey contract to supply, install and commission all the electric equipment for new container terminals at Durban, Cape Town, Port Elizabeth, East

The sign board refers to a total of 1602 locomotives supplied between 1963 and 1985. This figure includes those 5EI loco's which were locally manufactured, plus all the 6EI units.

The class 9E locomotives operating on Sishen-Saldanha line were all supplied by GEC. Operating in consists of three, the locomotives were designed to haul 200 wagons 2,2km in length, with a trailing load of 20 000 tons.

London and Kaserne. The scope of the contract required GEC to supply 285 panels of 11Kv switchgear, 123 distribution transformers for 33 substations, 21 kilometres of 11Kv cable, lighting and low voltage equipment, plus the complete management, installation and testing responsibility. The terminals were handed over in various phases throughout 1977, and by December 1978 South African Railways reported that 70% of the country's import / export trade, other than raw materials and commodities, was being handled by container terminals. It was a project that became a focal point of international interest in the field of container development. For GEC South Africa this was a highly successful project, possibly one of the best turnkey projects the group ever

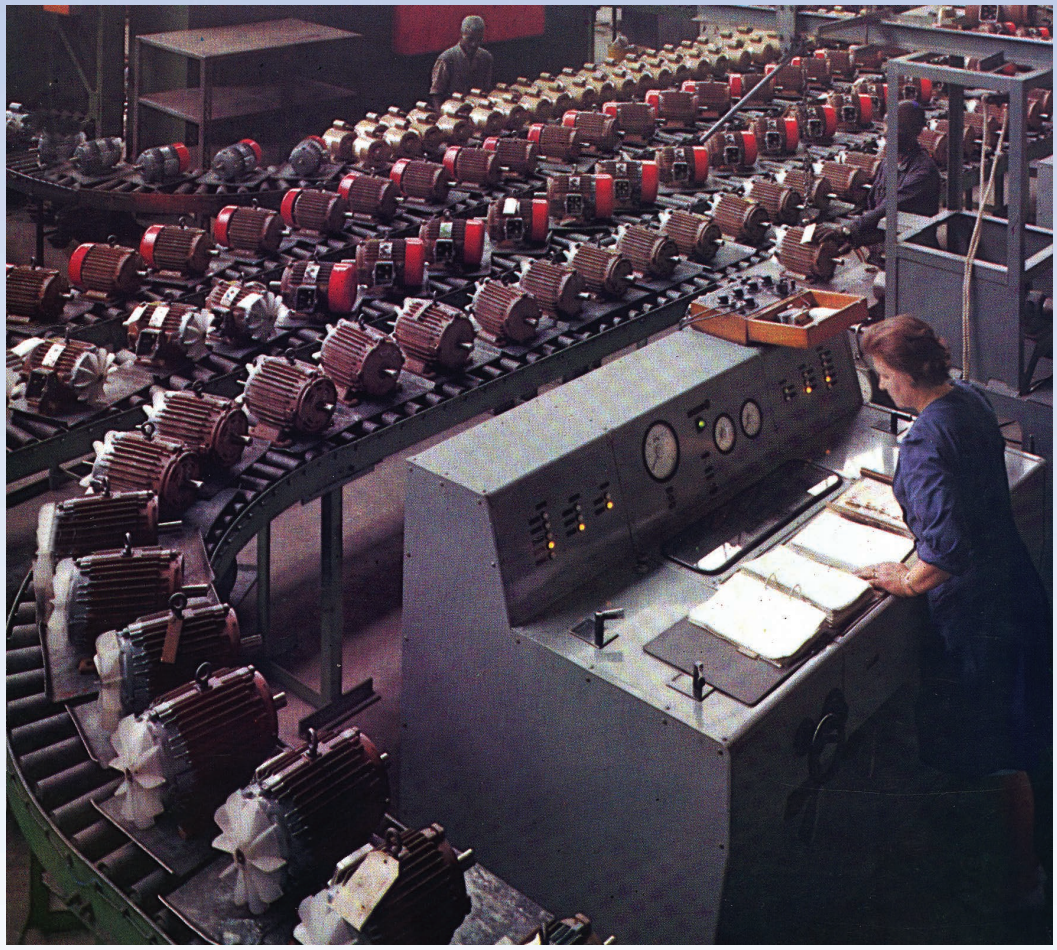
handled.

The new deep-water port at Richards Bay was called upon to help with the overloading at Durban in addition to its main role of handling ever-increasing tonnages of coal exports. In 1979 GEC was awarded a turnkey contract for the electrical supply and installation for the Richards Bay bulk cargo quay, which called for substantial quantities of switchgear, transformers, minisubs, cabling and LV equipment. At the time it was the largest turnkey project GEC had undertaken, and was spread over two years.

In a new contract, South African Railways placed an order with GEC for 43 modular type trackside substations, part of which were designated for the "coal line" from Ermelo to Richards Bay, and part for the "iron ore line" from Thabazimbi to Brits. The scope of work was later extended to include twenty seven 88Kv 20 MVA trackside transformers. The coal line was complete at the end of 1978 and the iron ore line in mid-1979.

GEC group companies had played an important role in the development of three key sectors of the economy - mining, energy and transport. In the process of helping to build this infrastructure, the group had effected the development of many sub-sectors of the local industry through subcontracting, technology transfer, procurement and employment, to the value of approximately half of the aggregate contract values.

The container terminal at East London. In 1976 GEC was awarded a turnkey contract to supply complete electrical installations at the newly built container terminals at Durban, Cape Town, Port Elizabeth, East London and Kazerne.

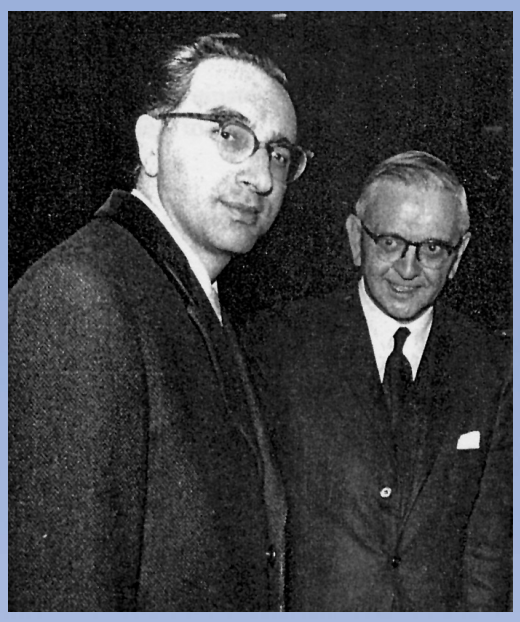


In 1965 Electrical Machines started 24 hour production shifts to keep up with the demand for their range of small motors.

CONSOLIDATION

GEC's financial health and market position deteriorated sharply throughout the 1950's; the company lacked direction, leadership and management. In 1960 English Electric formally proposed a full merger with GEC, the terms of which would have given English Electric shareholders 60% of the equity in the merged company. The GEC board rejected the proposal and surprisingly English Electric did not pursue matters with GEC shareholders where it stood a good chance of acceptance. GEC was rudderless and highly vulnerable yet despite all its problems the GEC board took the very unusual step of entering the acquisition market for only the second time in the company's history. In 1961 GEC acquired Radio and Allied Industries (R&A), whose main business was in high volume production of radio and TV sets. The company was owned by Michael Sobell and managed by his son-in-law Arnold Weinstock. R&A was relatively small but highly profitable, particularly when compared to others in that industry. GEC issued new shares for the acquisition which placed an £8m valuation on R&A, compared to the £2,5m when R&A was first listed in 1958. The acquisition of R&A effectively gave Sobell, Weinstock and their families 14% of GEC's equity. Weinstock was appointed to the GEC management committee but soon after stepped down through frustration and he retreated, temporarily, to R&A. The financial position at GEC continued to deteriorate at an alarming rate, finally resulting in most of the board standing down. GEC's overdraft at end 1961 was £11,2m and Midland Bank was most unwilling to lend more.

Arnold Weinstock was appointed Managing Director of GEC with effect from 1 January 1963. Weinstock (38) had already brought much cash in long term projecs. Every employee in the GEC group quickly learned that cash was king and return on investment was far more important than market share. GEC soon responded to the Weinstock medicine and started regaining financial health but Weinstock could see that further growth and development of his group was limited because of the same structural problems facing his main rivals, namely a burgeoning industry in UK with too many suppliers each carrying too much cost all chasing diminishing markets. Weinstock's progress at GEC had not gone unnoticed and he received encouragement from the British Industrial Reoganisation Corporation to lead a rationalisation programme for the UK electrical engineering industry.



The Chief Executives: Arnold Weinstock (GEC) and Sir Joseph Latham (AEI) meet soon after AEI conceded defeat to GEC in the takeover battle on 9 Nov 1969.

Lord Nelson (English Electric) gives his hand to Arnold Weinstock (GEC) after shareholders had approved the merger of the two companies on 6 Nov 1968.

Kenneth Bond, his Financial Director from R&A into GEC and soon after he brought R&A's Legal Director David Lewis into GEC. This trio formed the nucleus of GEC management for the next 20 years. Arnold Weinstock and Kenneth Bond immediately began administering some very strong medicine to a very sick GEC, embarking on a rigorous programme of trimming out all excess costs in the group and disposing of many companies that were either non-profitable or poor cash generators. Typically the turbine generator business was sold to C.A. Parsons because it tied up too

In 1967 AEI posted half-year results showing profits dipping from £6,9m in the prior period to £3,7m, despite an earlier upbeat profit forecast. Weinstock considered it an appropriate time to submit a bid for AEI, after earlier talks of a friendly takeover had failed. On 28 September 1967 GEC launched a £120m hostile bid which was rejected by the AEI board and a very bitter takeover battle ensued. GEC twice increased its offer, finally to £160m. The AEI board and management put up a spirited defense and did good work to gain support of institutional investors but finally it was their ongoing failure to deliver on profit forecasts that swayed opinion. In contrast GEC's pre tax profit in Weinstock's first year (1963) was £6.1m, rising to £11.8m in 1964 and to £17.3m in 1965. By 9 November 1967 GEC had secured plus 50% of the voting shares in AEI and took control.

Barely nine months after the AEI acquisition Weinstock was approached by Lord Nelson of English Electric to consider a merger of the two companies, following a

hostile bid for English Electric from Plessey. GEC and English Electric commenced talks in August 1968 and within three months the merger agreement had been signed and approved, exactly 50 years after the formation of the English Electric group of companies. Interestingly the British government decided it was not necessary to refer the proposed merger to any competition authority, such was their desire to see the merger happen.

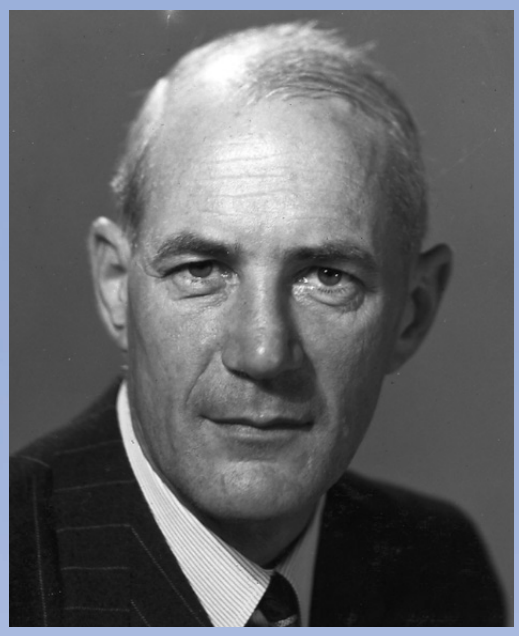
It was not long before these changes were felt in South Africa, with the local GEC management extending their newfound responsibility throughout acquired operations. As in the UK, the first emphasis was on cost cutting and disposals, but only a limited programme of rationalisation was initiated because of various local partnerships and structural complications that existed within the South African operations. Both AEI and English Electric were far larger groups than GEC in South Africa and each had an entirely different profile to that of GEC. The former two companies were both heavily involved in the supply of total engineering systems supported by large manufacturing facilities and strong engineering teams. Together they were the dominant suppliers of power engineering products and systems to the railways, Eskom, the municipalities, the mining industry and other major industrial installations. GEC concentrated on the distribution of a wide range of electrical products, few of which were manufactured in GEC factories.

It soon became clear that in South Africa, at least, GEC were accomplished managers of trading operations but were out of their depth when confronted with the task of managing the large engineering and manufacturing activities of AEI and English Electric - a view widely shared throughout local industry and in the marketplace. The years 1967 to 1969 proved to be a most difficult period; the now enlarged group lost many good people, lost market share, lost many good friends in the industry and eventually lost the confidence of the shareholders in the UK. Jake Crompton resigned end 1968 and Roger Price left about 18 months later. These early departures coming so soon after one another were a serious blow to morale, particularly among the senior managers of AEI and English Electric.

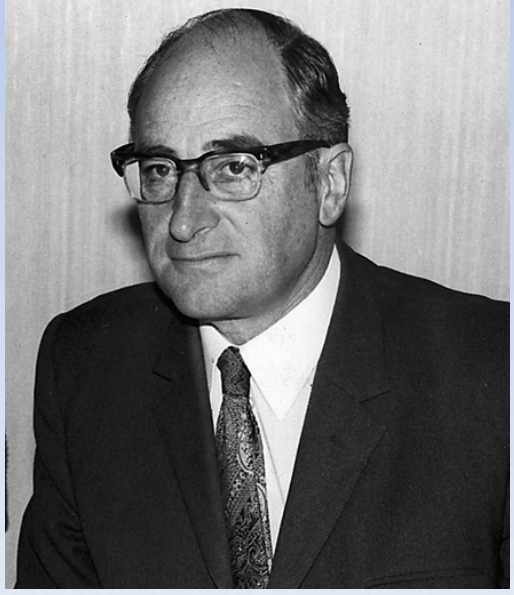
But, despite these difficulties, there were many people both within the group and outside who could see the potential offered by an enlarged GEC South Africa group, suitably structured and with a sensible plan in place that would lead to the elimination of duplicate facilities, which undoubtedly existed. The South African economy was booming and certainly had a strong appetite for electrical engineering products and services, but GEC South Africa needed leadership, and a plan to address the local structural and shareholder issues that were blocking the way to a restructured and fully rationalised group.

While these issues were being addressed, mainly by the shareholder groups concerned, operational management teams from GEC, AEI, English Electric and First Electric (still a separate, rival entity) agreed to work together to compile a blueprint for a future GEC South Africa group, setting out its structure and a rationalisation plan for its manufacturing facilities and product ranges. Overcoming long-time rivalries, the working groups co-operated well and focused on those areas where there was heavy manufacturing and/or engineering activity.

Broadly, it was envisaged that the



After graduating from Kings College, Cambridge, Roger Price trained as an engineer with Siemens in Germany and then English Electric in the UK. He returned to South Africa in 1935 and started his career with VFP until 1940 when he joined the South African Forces. At the end of 1945 Roger was appointed Works Director of the English Electric Co. of South Africa and became Managing Director of the company in 1960.



A graduate of Wits University, Tony Charles joined the Victoria Falls & Transvaal Power Company where he undertook a two year pupilage. He joined English Electric in South Africa in 1948 and spent various periods in UK factories for product training. He was appointed Works Director of the South African Company in 1963 and Managing Director of GEC - English Electric in 1969. In 1980 he was appointed Managing Director of GEC South Africa.

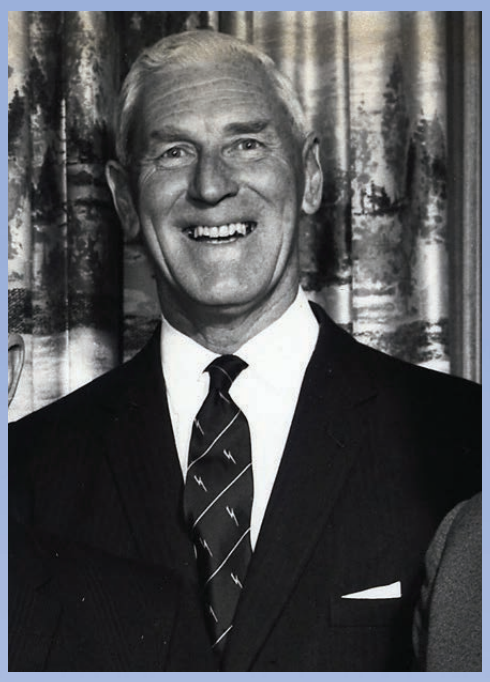
future GEC South Africa would be structured as follows:

- A Machines group to be based at Benoni, but also including the (FEC-owned) foundry at Springs and, for management purposes, all traction manufacturing activities (which would later occupy the entire Driehoek facility);
- A Power Distribution group to be based at Knights, which would include all of the Johnson & Phillips activities then based at Driehoek;
- An Engineering group to be based at Kew, to include, for management purposes, turbine generators, traction projects and mine winders;
- A Telecommunications group to be based at Kew, largely centred on AEI Henley.
- An Air Handling and Consumer Products group, which would cover most of the remainder of the group's activities, including Woods Fans, Satchwell Controls and the appliances, medical and lighting companies.

In total, the enlarged group would employ more than 6 000 people in seven factories and six regional offices.

By the end of 1969 Stanhope Gate had decided that change was necessary in the top management of the South African group and, crucially, Weinstock had personally identified Frank Lester as the right man to lead local operations as managing director. Lester was a long-serving employee, having joined via the British Thomson-Houston graduate training scheme. He had been awarded a GE fellowship to study further in the US and, on his return, spent virtually his entire career in Traction Division. As South Africa was by far the largest export territory for the UK's traction business, Lester had visited the country many times and fully understood the intricate relationships between South African Railways/AEI/English Electric/Union Carriage and Wagon Works and, of course, GEC Traction UK, which was the technology provider.

Lester arrived in South Africa in January 1970, clearly intent on accelerating the restructuring of the local group. He concentrated on resolving the structural and shareholder issues that were holding up the project, which mainly involved valuation differences with minority shareholders in First Electric Corporation and later LH Marthinusen, both of which were JSE Stock Exchange listed companies. It took some time before these were fully resolved. Meanwhile, Lester's deputy, Tony Charles, was designated to lead and co-ordinate the physical



After graduation from Cambridge University, David Stanley joined Metropolitan Vickers UK. He was transferred to South Africa in 1947 and soon after was appointed MD of Metropolitan Vickers SA. In later years David became Chairman of AEI South Africa and Chairman of First Electric Corporation

Immediately after graduating from University of Cape Town Jake Crompton joined BTH in UK in 1948 as part of the intake for the two year graduate training programme. He returned home to BTH South Africa end 1950 but went back to UK in 1954 for a further training programme on mine winder electrics. Jake held various positions in BTH/AEI before being appointed Managing Director of AEI South Africa in 1966.

Don Nash was employed by Simplex Electrical in the UK. His first appointment in South Africa was as Managing Director of a new subsidiary, Henley-Simplex, later to become AEI-Henley SA. In 1965 Don was appointed Managing Director of First Electric Corporation. After the group was reorganised in the late 1960's Don remained with the group and was appointed Chairman of GEC Engineering.

integration programme.

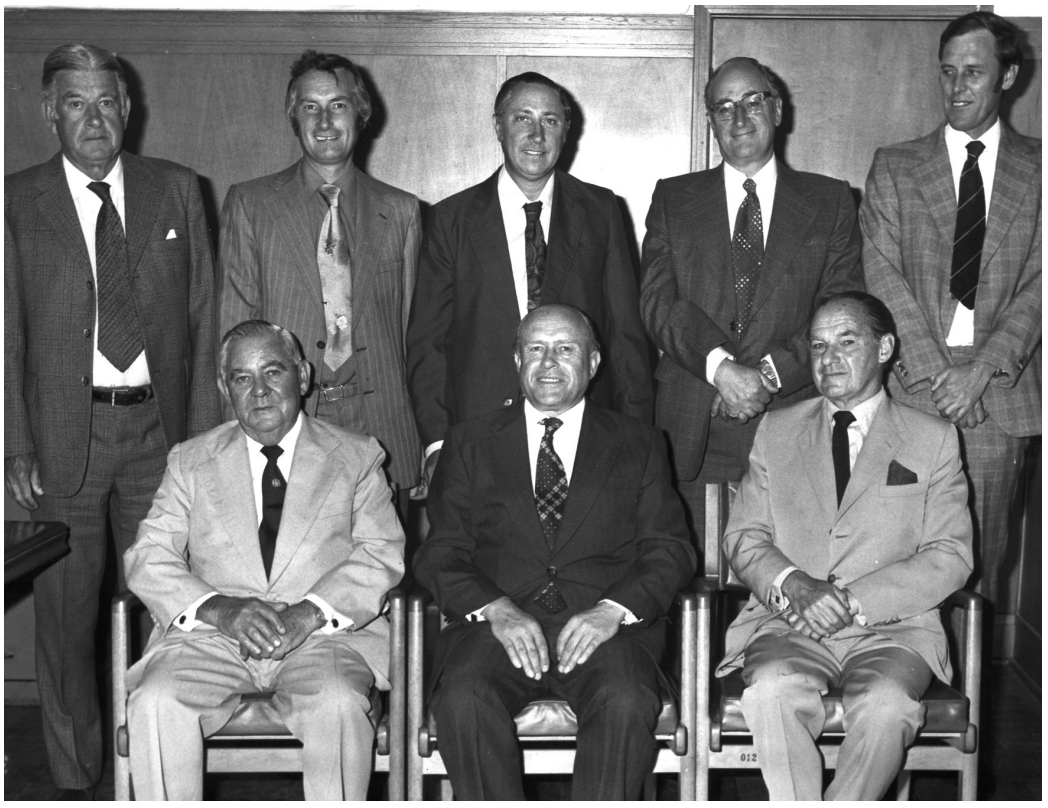
Restructuring the Benoni, Knights and Driehoek operations was to prove an enormous task, not simply because of the sheer amount of equipment that had to be moved from one factory to another, but because it also meant that each of the three factories had to be re-laid to meet the new challenge of being a dedicated manufacturing facility. At the same time, all three plants were substantially upgraded, particularly Driehoek. All in all, it was a massive project that had to be undertaken while normal production commitments outlined in the preceding pages had to be met.

Rationalisation of product ranges was equally challenging, but absolutely essential as there was duplication across almost the entire spectrum with the notable exception of traction equipment, where South African Railways had long since insisted on product rationalisation between AEI and English Electric. Product rationalisation required some tough decisions such as phasing out a duplicate range fairly soon after it had been introduced as a requirement of metrication, as happened with FEC's range of low voltage motors, and English Electric's range of high voltage machines. These decisions would cascade down to the Foundry and Lamination and Tooling Divisions in their roles as component feeders to the main divisions.

At Knights, equally important decisions were facing the management of Power Distribution, where the most pressing challenge was to rationalize ranges of medium voltage switchgear. It was decided that the highly successful Johnson & Phillips AG16 gear would be the range to take the division forward - which it successfully did for many years - and the English Electric OLX range would be

English Electric branch managers gather at Benoni for their annual product update and meetings. From left to right : Tony Charles, Peter Martin (Cape Town), Gilbert Jessup (Port Elizabeth), Roger Price and Jay Jarvis (Durban). (1962)

Soon after World War 2, Metropolitan Vickers acquired a controlling interest in LHM with the aim of converting it into a local manufacturing base but this was not to be. In 1947 Metropolitan Vickers effectively arranged a share swop, selling their equity in LHM in return for a controlling interest in FEC. As a result of group reorganisation in the late 1960's LHM became a subsidiary of GEC. LHM was listed on the JSE between January 1972 and April 1983 when GEC disposed of it's entire equity stake in LHM, thereby severing a link with the GEC group which had existed for 35 years.



*Board and Senior Management in 1978: **Back row** (from left), Alf West (Company Secretary LHM), John Stoddard (Financial Director GEC South Africa), George Williams (Managing Director LHM), Tony Charles (Director LHM and Deputy Managing Director GEC South Africa), Ian Tudhope (Managing Director - Designate LHM). **Front row** (from left) Solly Milner (Commercial Director LHM), Frank Lester (Chairman LHM and Managing Director of GEC South Africa), Robert Enthoven (Non-Executive Director LHM).*

phased out.

Local manufacture of metal-clad medium voltage switchgear, which had commenced as far back as the mid 1940s, was all based on bulk oil-type designs. Local content had increased substantially but designs continued to be based on bulk oil-type technology until the early 1970s when local design work started, perhaps driven by the need in mining applications to move away from oil-type circuit breakers with their inherent fire risk and high maintenance needs. The alternative choice of interrupter technology facing GEC and its rivals was vacuum or SF6. Reyrolle Switchgear chose the SF6 route, probably influenced by the desire for full local manufacture and the belief that it would never be economically viable to produce vacuum bottles in South Africa, the process being highly capital-intensive. GEC chose the vacuum route, and set up a local project to design and develop what was later to be known as the SBV range of medium voltage switchgear, initially incorporating imported interrupter units. Much later, during the late 1980s, a decision was taken to establish a vacuum bottle manufacturing facility at Knights and, in 1990, the first locally produced vacuum interrupters were being supplied into our own switchgear company - and to some of our competitors.

The transfer of vacuum interrupter technology was extremely complex and demanding on local management but, once complete, it was to secure and indeed enhance GEC's dominant position in the medium-voltage switchgear market. The distribution transformer business was also enhanced by the introduction of wound core technology licensed from Westinghouse, which gave it a significant edge over the competition

By the end of 1971 the major part of the factory relocation (other than traction) and product rationalisation programme was complete, and a fully integrated GEC South Africa looked forward to 1972 with a great deal of confidence and better team spirit than had existed in recent years - quite rightly so, because the new GEC South Africa was now ideally positioned to become a formidable force in the local market.

The Middle East oil crisis in 1973, which rocked the global economy and sent inflation rates soaring, was strongly felt in South Africa and provided a sharp reminder of the country's dependence on imported fuel supplies. Sasol had made major strides in its development of oil-from-coal technology since Sasol 1 had been commissioned in 1950 and a decision was taken to build a second, much larger, oil-from-coal plant at Secunda. Sasol appointed Fluor Corporation as the managing contractor and work commenced in 1975. Demand for all types of electrical equipment was enormous. In the case of electric motors, the volumes were so high and the lead times so short, it was thought no single manufacturer was capable of meeting the requirement. After discussion with all players, Sasol encouraged local motor manufacturers to pool their resources and approved the formation of a consortium. The Consortium of South African Motor Manufacturers (CONSAMM) proved to be highly successful in co-coordinating supplies of the entire electric motor requirement for Sasol 2, with GEC's contribution being 50% of the total.

Before Sasol 2 was finished, a decision was announced that Sasol 3 was to be built on an adjacent site, with most of the major suppliers and contractors, including CONSAMM, being retained. The Sasol 2 and 3 projects proved

The Benoni factory was built in 1948 and was previously the home of English Electric.

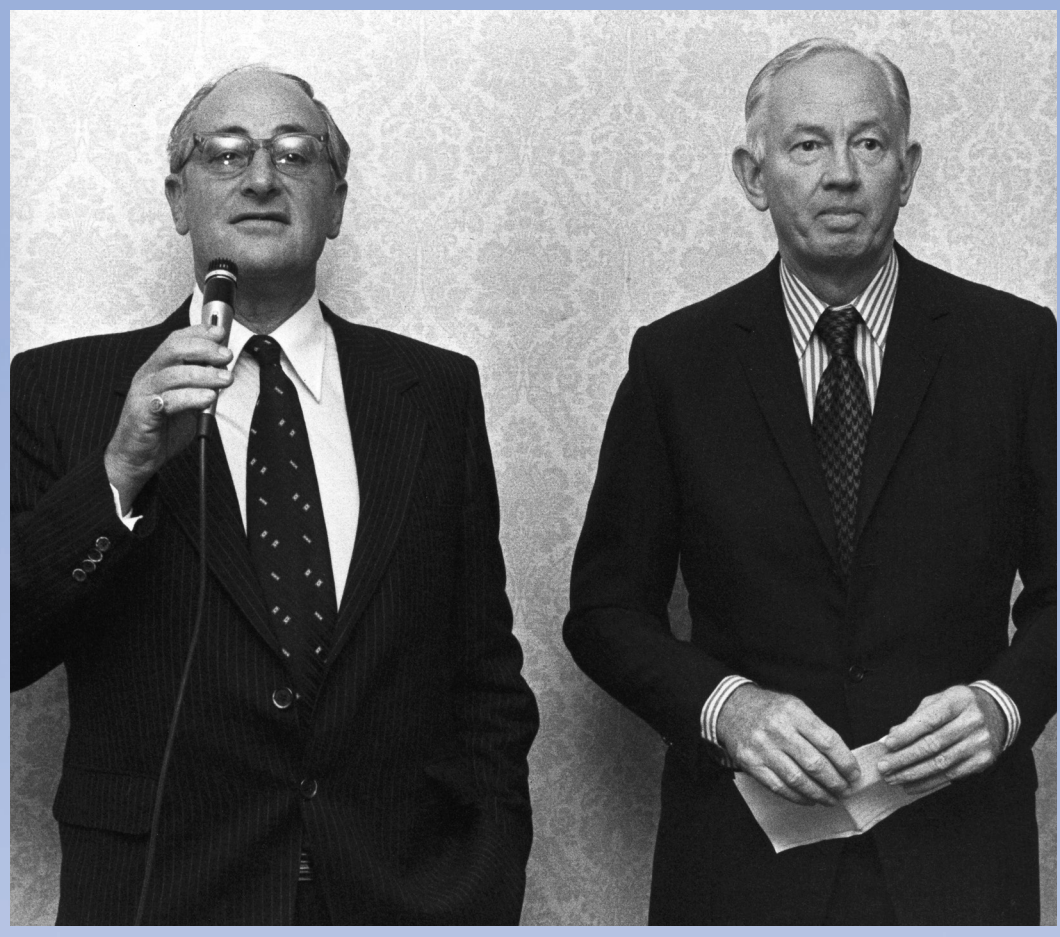
The Driehoek factory, originally the home of Johnson & Phillips, was substantially expanded and upgraded to become a dedicated traction facility in 1976.

Alstom's Knights manufacturing plant was previously the home of First Electric Corporation.

to be highly successful investments that technically and commercially reduced South Africa's dependence on oil imports and kick-started huge investments in downstream products in the petro-chemical industry. As a result, Sasol was to become the acknowl-

edged world leader in oil-from-coal technology that it is today.

The oil crisis of 1973 had given added impetus to several railway electrification projects, of which the most important was the electrification of the coal export line between Witbank and Richard's Bay. The project was completed in 1978. The oil crisis also triggered a rapid increase in the price of gold, which once again resulted in the planning and commissioning of new mines such as Anglo American's WDL's South Shaft and Elandsrand GM and Gold Fields' Deelkraal Mine in the Mid Wits area. At a time of fuel restrictions and speed limits of 80 kilometres per hour, Anglo American ordered seven new winders for Elandsrand plus four others for Vaal Reefs and Free State mines, but market perceptions of continuing confusion within GEC and strong competition saw all of these orders being lost to European competitors.



Tony Charles introduces Mr A.M. Rosholt, Chairman of Barlow Rand to senior managers of the group. An announcement had just been made that Barlow Rand had acquired 50% of the equity and management control of GEC South Africa and Mr Rosholt had been appointed Chairman of a reconstituted board. (1978)

The setbacks were, however, overcome early in 1974 with the winning of an important order for three large winders for Deelkraal mine, one of which was a large BMR rock winder utilising the identical DLC156/62 motor to that driving the East Driefontein Gearless BMR winder. The winning streak culminated in 1975's now famous omnibus order from Gold Fields for 13 new winders for all of the sub-vertical shafts of Kloof, East Driefontein and Deelkraal. GEC Mining Department was well and truly back in business.

The omnibus contract was also a major innovation for the local GEC group in that it increased local content and activity; no fewer than seven of the 13 DLC motors were designated for local manufacture by GEC Large Machines Company in Benoni, using identical UK designs, with only the commutators being imported. This had been a key factor in securing the contract for GEC, all parties being keen to increase local content on major contracts, something which was also fully supported by the UK management. This approach was to become a key factor in the company's success and market leadership in South Africa.

In 1976, Tony Charles was elected President of the Steel and Allied Industries Federation of South Africa (SEIFSA), an office he held with great distinction. His term of office came at a time when SEIFSA and its members were facing many difficult challenges, with organised labour flexing its muscles under new legislation dealing with wage bargaining and, of course, at a time when the country was experiencing political turmoil. SEIFSA celebrated its 60th anniversary in 2003, and continues to play an important role in the metal industries, particularly in skills training and development.

By the late 1970s political storm clouds were starting to gather over South Africa with moves in the international community to isolate the country politically and economically. Such moves were to prove particularly troublesome for international and multinational companies operating in South Africa, more so if they had a wholly owned local subsidiary. Initially, these moves took the form of curtailing any new investment in South Africa, but ongoing shareholder activism abroad exerted more and more pressure, to the extent that many multinationals started to question the cost of doing business in South Africa at all.

United States-based companies in particular started making withdrawal plans, and set up distribution networks to protect their position in the local market as best they could. These same

pressures later spread to European-based groups and GEC was no exception.

But the Europeans had far deeper roots in the country, far bigger investments and certainly far greater strategic interests in the local economy than had US companies. GEC fell very much into this category - facing shareholder and social pressures because of its involvement in South Africa, but at the same time having a very successful local subsidiary and a number of long-term strategic interests, particularly in the supply of turbine generator sets to Eskom.

Lester was mandated to come up with proposals to address these issues and he and certain advisors submitted the recommendation that the profile of GEC South Africa needed to be changed, and that this would be achieved by reducing its status within the GEC group from a wholly owned subsidiary to an associate company. This would require selling 50% or more of the local group's equity and management control to a South Africa entity.

Once the plan had been accepted at Stanhope Gate, it was not long before the right partner was identified in Barlow Rand Limited, South Africa's largest mining and industrial conglomerate. In 1978 GEC signed an agreement to sell 50% of the equity in the local group to Barlow Rand, who would also assume management responsibility for the group.

From April 1 1978 GEC South Africa became a subsidiary of Barlow Rand, and Mr. AM Rosholt, then chairman of Barlow Rand, became chairman of a reconstituted board of GEC South Africa. For a variety of reasons not all of GEC's interests in South Africa were included in the jointly owned company; the companies excluded

At a farewell function for Frank and Eve Lester, Tony Charles presented a chess set with the individual pieces cast in bronzed stainless steel. These castings were produced at GEC's Springs Foundry.

were mainly partly owned or partnerships where rights of pre-emption often existed.

Frank Lester was awarded the OBE in the Queen's birthday honours list in June 1976 for his outstanding contribution to British commercial interests in southern Africa. The timing of Lester's secondment to South Africa had been opportune in many ways, not least because it coincided with the appointment of Dr JGH Loubscher as general manager of South African Railways. Kobus Loubscher had already announced his intention to substantially expand the country's rail network and upgrade its infrastructure, including rolling stock.

Loubscher also made clear his insistence that local manufacturers would play a greater role in the Railways' expansion programme, essentially to lessen his dependence on overseas supply and at the same time to improve the standard of his local supply network - which would require significant investments to upgrade manufacturing facilities, engineering and test resources, and quality control.

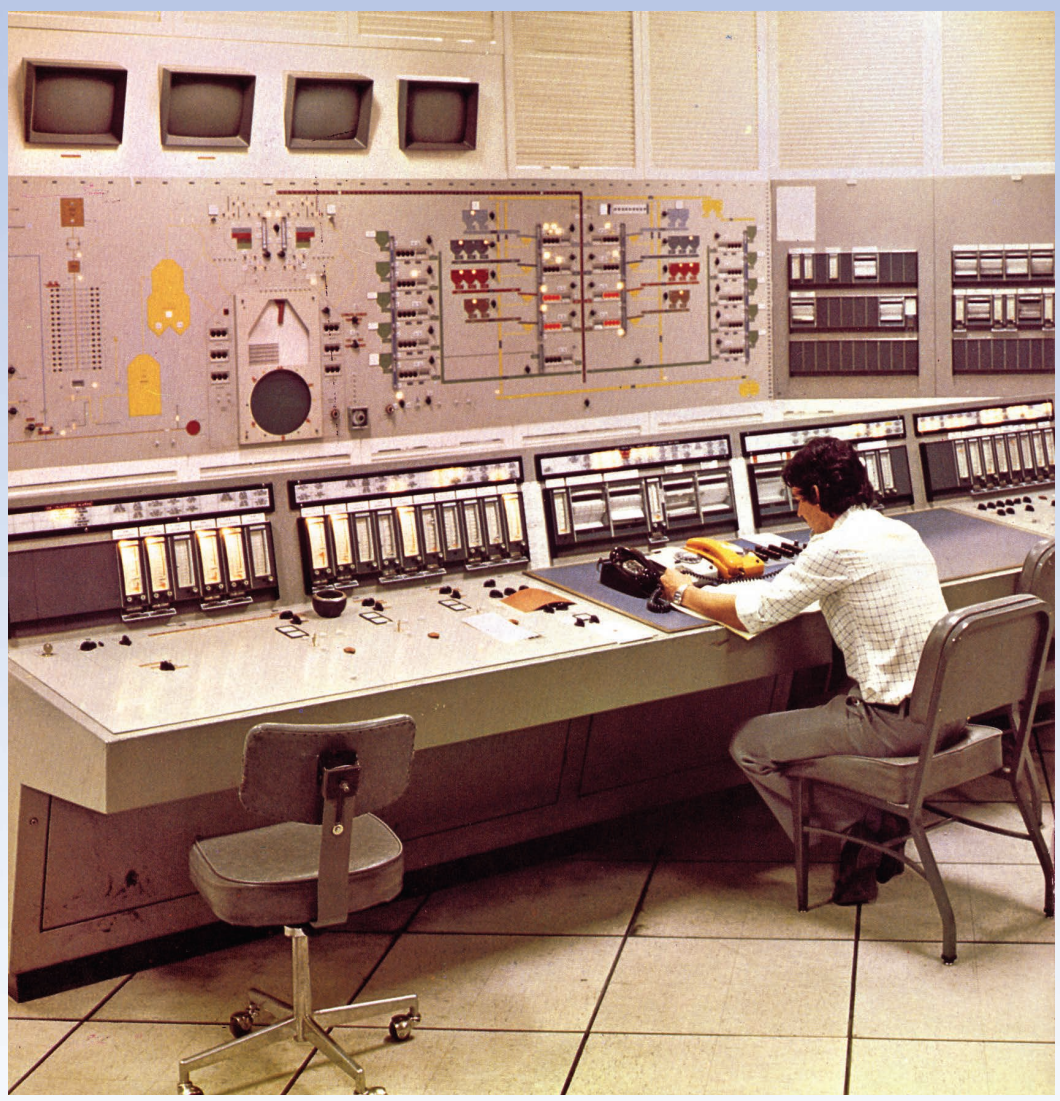
All of this was coupled with a steady but relentless demand that dependence on overseas supply be reduced wherever possible. Lester's training and background made him ideally suited to seize the challenge and he relished the opportunity of upgrading Driehoek - traction's future home - to a 5-star facility, and making the traction business a 5-star contributor to the group's overall performance.

It seems Lester had already made up his mind that his last major assignment in South Africa would be to oversee the repositioning of the group with a local partner, thereby securing GEC's future and long-term interests in South Africa. With that now achieved, he returned to the UK at the end of 1978 and went into retirement after almost 40 years with the group. Tony Charles took over as group managing director.

CHANGES IN DIRECTION AND CONTROL

The immediate challenge of the 1980s for the senior management of GEC South Africa was that of adapting to the new life of having two shareholders as Barlow Rand began to take up its responsibility as the managing partner. There was much in common between GEC and Barlow Rand, but there were many differences, too, particularly in management style and philosophy. This did not make life easy for the local management of GEC. Barlow Rand brought many benefits to the group; their access and well-developed lobbying skills at all levels of government and industry were much needed and appreciated. Their strong belief in in-group purchasing certainly placed GEC in an advantageous position for the substantial amount of business put out by Rand Mines, the sugar mills and industrial operations within the Barlow Rand group.

GEC Engineering was awarded a turnkey project to supply, install and commission electrical equipment for the 5000 tonne/day blast furnace at Iscor, Newcastle.(1977)



GEC installed a comprehensive interface between the electrical equipment and instrumentation system to ensure fully automatic operation of the Iscor Newcastle plant.

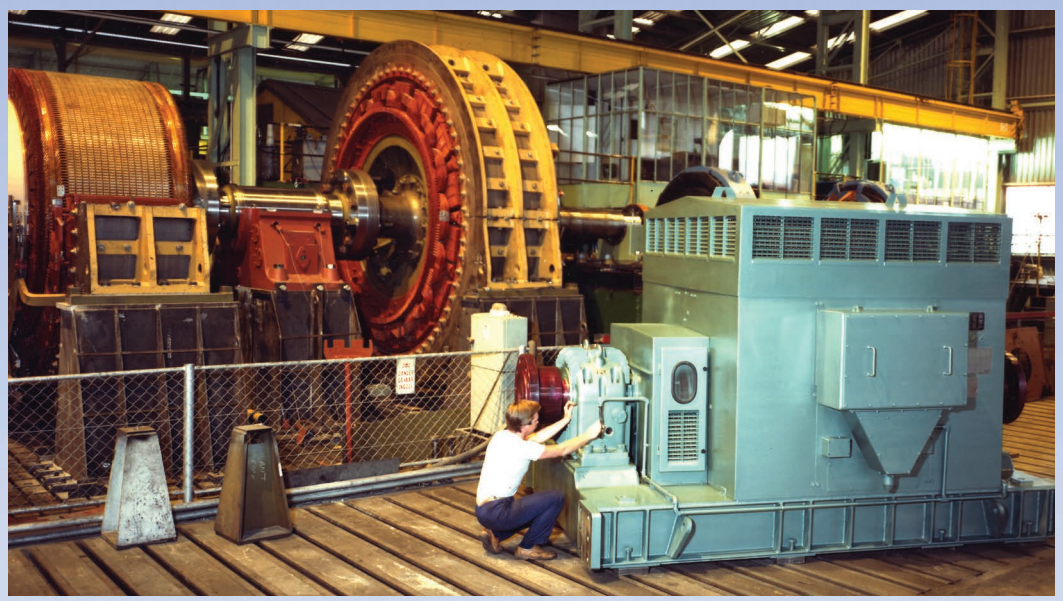
But, as Barlow Rand gained an understanding of each of the business units within GEC, it became increasingly disturbed about the level of technology available to the South African company, and its competitiveness in the local market. Certainly, orders were being lost because of a lack of technology, or because the technology was not leading edge. An example was traction where, despite GEC's many in-built advantages, recent orders for locomotives had gone to German and Japanese competitors who could offer superior technology. The shareholders agreement determined that GEC UK would be the technology provider of choice to the group. Barlow Rand's serious concern over GEC's ongoing investment in technology was strongly supported by some in the local GEC management team. It was to become an issue of differ-

ence between the two shareholders that would eventually lead to GEC South Africa increasingly looking elsewhere for its technology requirements.

A steady flow of good orders was received in the early 1980s from most of the mining house customers, and the local company was building its local expertise and design capabilities to undertake upgrading work and to increase local content. This period was also characterised by technology transfer from the UK operations to South Africa in the form of a number of young engineers who were sent to South Africa for two-year training periods; many of them chose to emigrate to South Africa, where they continue to represent a core of the company's expertise even today. Several South African engineers also spent time in the UK to receive training and on contract work.

A major contract was secured in 1988 from Rand Mines for the electrics of three 4MW DC Ward Leonard Winders for the proposed new platinum mine at Rhodium Reefs in the Eastern Transvaal, and a further contract was secured in early 1990 from Gencor for three DC thyirstor-fed winders for Winkelhaak No 6 shaft, but the dark clouds of economic downturn in the South African and indeed world economies were gathering. The South African currency was in rapid decline, causing prices for imported equipment to climb, and political unrest was escalating. The impact on the mining industry was significant, and all mining houses were rationalising their head offices and decentralising or outsourcing their consulting engineering services. The demise of the once mighty Rand Mines resulted in the three Rhodium Reefs winders being mothballed, and several mining projects were summarily cancelled.

Final inspection prior to delivery of a SBV vacume switshgear setup.



Mine winder motors in final assembly at Benoni works comprising of two 4000 kw 51 rpm 960 volt DC mine winder motors and a 3000kw 10 pole 6,6 kv double shaft extension motor for driving a MG set (Customer: Rand Mines for Harmony GM).

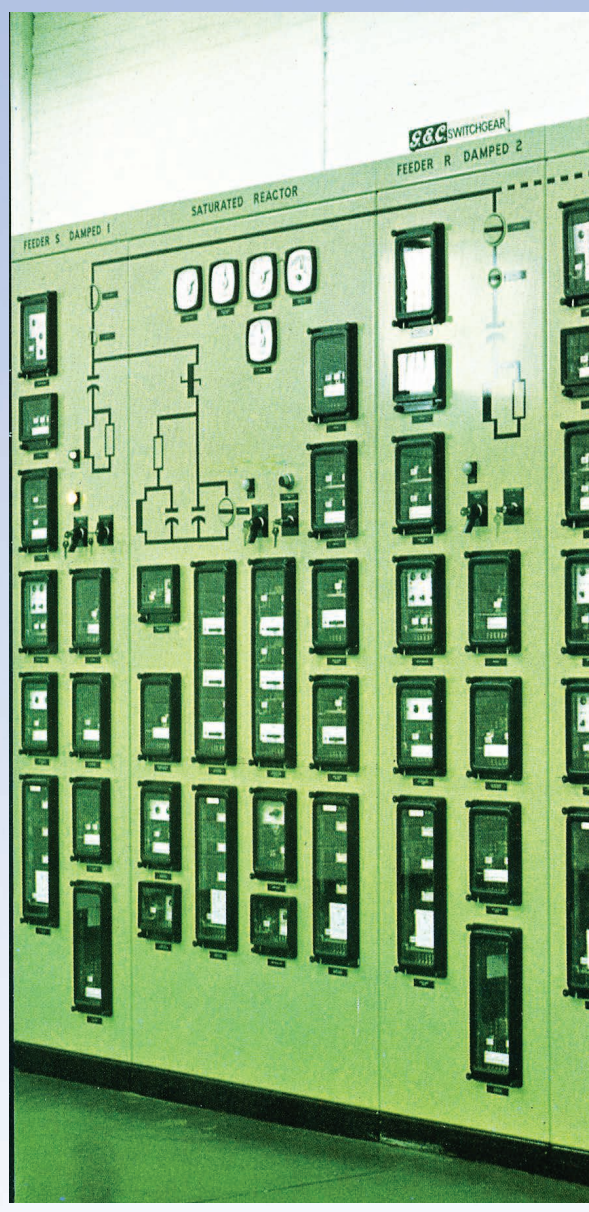
Two technicians using the New Schuman coil bending machine, installed at GEC Machines in Benoni, to produce 11 kV coils.

The 1980s had brought a significant change in the pattern of government spending, moving away from infrastructure and towards social-upliftment projects, particularly in the rural areas and townships. The distribution of electricity in these areas was poor or, more often, non-existent. The willingness of government and municipalities to start addressing this problem was strongly supported by Eskom, which could see excess power capacity looming - and which was anxious to open up new sectors of the market. The lead was taken by the Greater Soweto Local Council, which put together an ambitious reticulation scheme that would bring electricity to a larger part of Soweto. The project would require civil work, cabling, transformers, minisubs, lighting, etc. and, most of all, it would require good project management. The order for the initial phase of this R100m project was awarded to GEC in 1980. The client requested that Siemens be brought into the project for the remaining phases and GEC and Siemens formed a consortium named TESACON to fulfil the remainder of the contract. Technically, the project was very successful but its scale, very tight time schedules, unfamiliar terrain and conditions all made it an extremely challenging project for the owner, engineer and contractors. But Soweto was the start and thereafter township and rural electrification schemes went ahead rapidly, bringing many technical innovations unique to the requirement of South Africa's lower-cost reticulation needs, such as aerial bundled cable, completely self-protected transformers, electricity prepayment meters and many more.

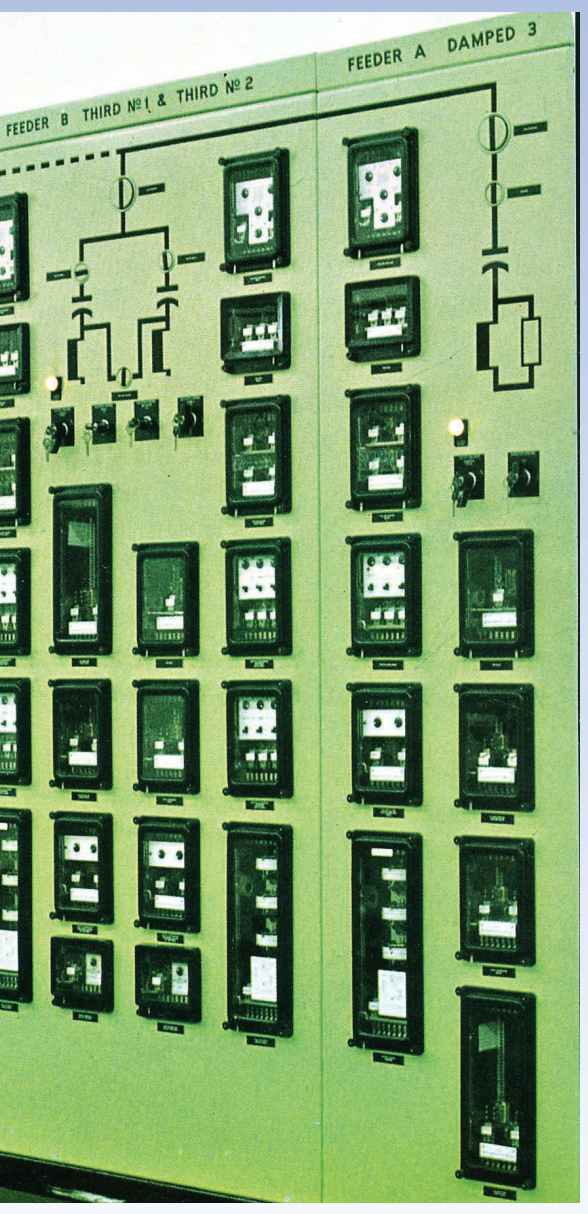
By 1982 local inflation was around 15% per annum and interest rates around 18% - clearly not conducive to economic growth. Mining activity also slowed due to weak demand and low commodity prices on world markets. The high economic growth rates of the 1960s and 1970s had certainly come to an end and South Africa was now facing recession. A good barometer of economic activity was Eskom's measured growth in electricity consumption. Although demand was still growing, the growth rate started to show a marked decline and continued to do so throughout the 1980s, which would inevitably have an enormous impact on the level of new generating capacity needed. However, by 1985, Eskom was commissioning up to five large units a year and, at the end of 1989, more than 8 600MW capacity was still on order. It was only in 1994 that all new power station construction activity, except at Majuba, ceased.

The first half of the 1990s saw no increase in growth. Indeed, the growth rate in 1992 was negative for only the third time in Eskom's history: -0,4% and a dismal 2,4% average for the first half of the decade. Despite this, Eskom confirmed its contract with GEC for Majuba power station in 1985, but it was not too long into the contract when Eskom requested discussions to re-schedule the build programme. The vastly increased efficiencies of the new "six-pack" stations that were coming on stream, together with reduced demand from the mining sector, pointed to a substantial excess of generating capacity. Construction of the second phase of Majuba was temporarily halted when Eskom encountered serious problems at the coalmine contracted to feed the power station. This resulted in the mine being abandoned and alternative supplies being railed from Khutala colliery near Ogies. In 1995 the go-ahead was given for construction of the second phase of Majuba, which comprised wet-cooled units. Domestic and industrial consumption amount to very little when compared to mining, so increased access to electricity through rural and township electrification

Component assembly at Switchgear's vacuum interrupter plant.



A control and protection panel for a GEC Static C as the South African Railways. Its function is to au provide power factor correction and to filter harmoni



Compensator installed for Iscor as well
tomatically stabilise the supply voltage,
cs.

schemes would have little immediate effect. After many deferments to the programme, the sixth unit at Majuba was brought into service in 2002 - 17 years after the order had been placed.

Local manufacture of traction electrical equipment was coming to an end in 1984/1985. As there was no longer continuity of contracts for GEC, the local facility looked to other contractors to provide work for the Driehoek factory. To do this, the facility was renamed South African Traction Manufacturers (SATM), and the traction projects unit responsible solely for GEC projects was relocated. Whilst SATM was successful in obtaining some work from Hitachi and Toshiba, their major input of work came from GEC for the class 10E1 locomotive. These locomotives are designed for heavy haul operation and are primarily used to haul coal trains from the mines to the Ermelo marshalling yard.

The spread of different technologies and production techniques, Hitachi, Toshiba and now GEC's new products provided new challenges for SATM. This compounded by shorter production runs, uncertainty as to future business, and a reliance on effectively a single end customer. Taking all this into account, a decision was taken in 1988 to close the local traction facility once the current contracts had been completed. This was to prove a long and extremely painful exercise.

In 1988 GEC was awarded a further contract for class 10E1 locomotives but, due to the decisions taken at SATM, most of the electrical equipment was imported. A limited resource was retained at Driehoek with a view to moving into the repair business and it was able to manufacture line inductors and pantographs for the second series of class 10E1 locomotives. The last class 10E1 locomotive was handed over to Spoornet in 1992. As there was no follow-on business for rolling stock, the traction project business unit was closed in 1993.

Over the years, from when the first 1E electric locomotive was delivered in 1925, a total of 2 300 locomotives and 1 300 motor coach units had been supplied, many of which are still the backbone of the rail system. Some have been in service for 35 years, which speaks volumes for the design and reliability.

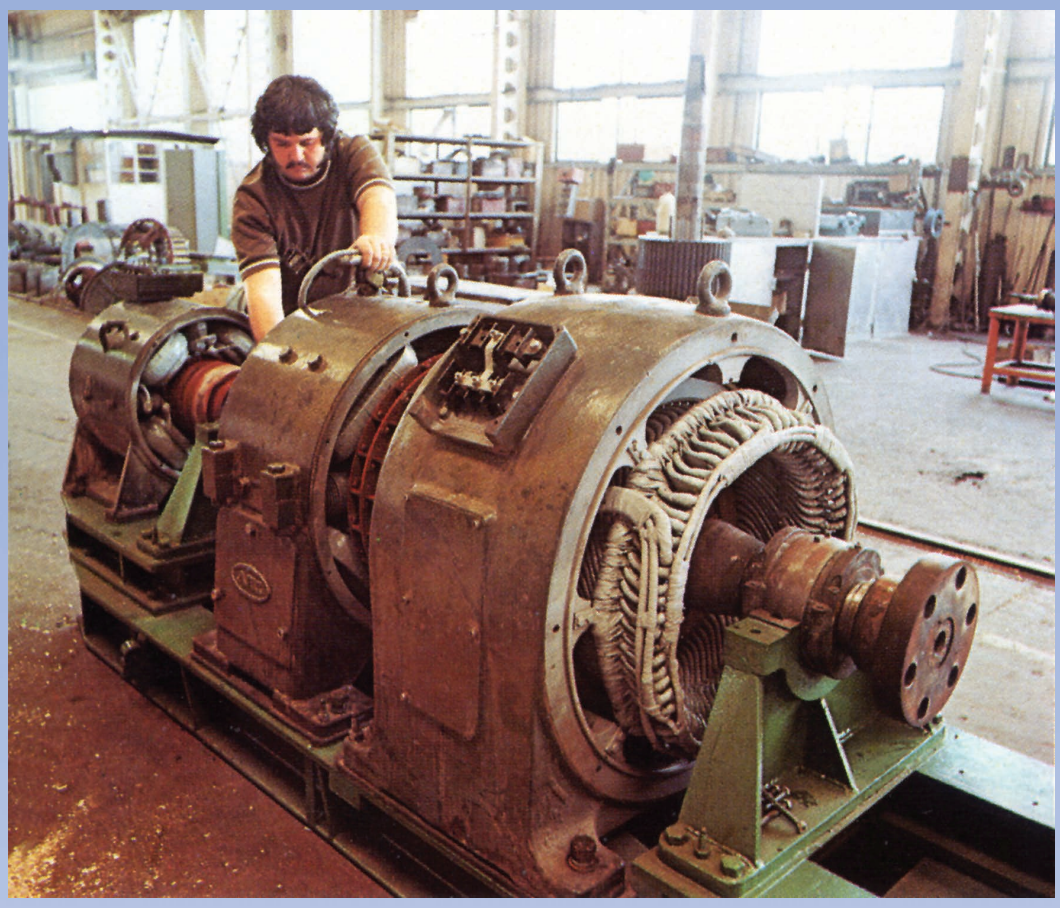
The very tough trading conditions in the electrical engineering industry in the mid 1980s were certainly not confined to South Africa. There was a worldwide slump in demand for heavy electrical plant, there were far too many suppliers, particularly in Europe, and vast excesses of manufacturing capacity. The industry needed a shakeout and competitors began to eye the possibility of mergers, partnerships or joint ventures. The successful formation of ABB a few years earlier had been an eye-opener and added to the pressure for the industry to restructure and reduce capacity. European Union rules were gradually knocking down national barriers that had traditionally protected manufacturers in their home markets, and cross-border competition became intense.

Weinstock realised his power systems businesses were simply not big enough to go it alone and had little difficulty in accepting that GEC needed a partner. Besides, the years of inadequate investment in technology was starting to hurt the group, making its future very uncertain. In surveying the market for potential partners, GEC found there were many possibilities but Weinstock had determined that the right partner for GEC should be a European group of about the same size

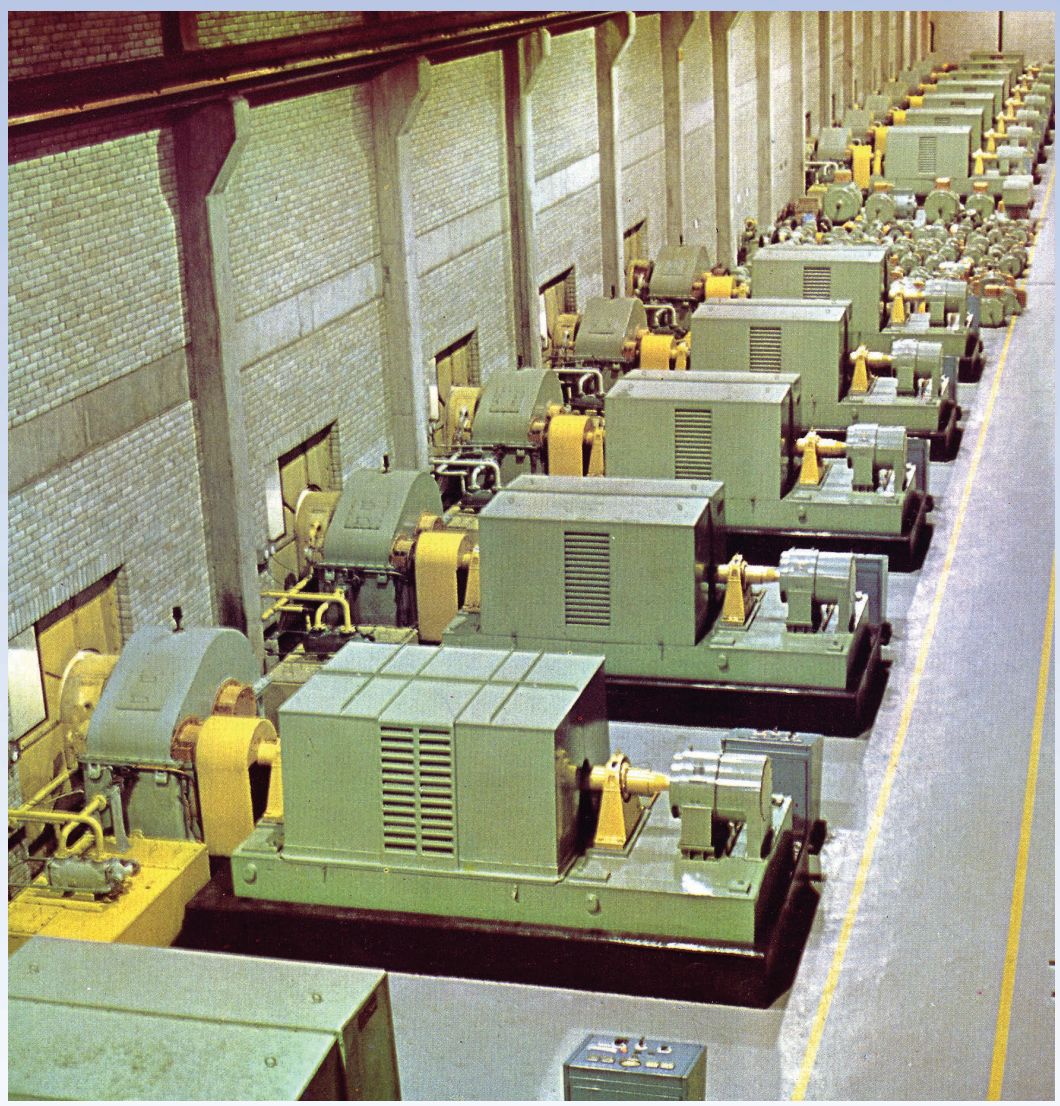
as GEC Power Systems so that it would be a marriage of more-or-less equals. ALSTHOM of France fitted the profile and was keen to engage in industry restructuring talks. The aim was to achieve a jointly owned company to which Alcatel, ALSTHOM's parent company, would contribute the whole of ALSTHOM whilst GEC would contribute all of its power systems businesses. In reality it would hardly be a marriage of equals as ALSTHOM's turnover was double that of its UK counterpart but of far more importance, ALSTHOM's plant and facilities were in good shape and its technology was world class in its three core businesses - energy, rail transportation and power transmission & distribution.

In 1989 a new company, GEC ALSTHOM, was established with Alcatel and GEC each holding 50% of the issued shares but with the stated intention that each would reduce its shareholding, in tandem, to a level not exceeding 24% and thereby create capacity for the new company to obtain a listing on international stock markets at a later stage. Significantly, the head office of the new company was to be in Paris and its chief executive officer was to be Jean-Pierre Desgeorges.

The management of GEC South Africa watched developments in Europe with interest, amazement, and a rapidly growing thirst for the new technologies that should become available to them, but the process of merging the GEC and ALSTHOM businesses in South Africa was delayed by negotiations between GEC, GEC ALSTHOM, Reunert and Barlow Rand on the terms of a new shareholders agreement for the proposed jointly owned local company. While these negotiations continued, the group was split for management and reporting purposes with GEC Power Systems reporting to GEC



A LH Marthinusen techmitian repairing a large motor.



Thirteen 3000 kW synchronous grinder motors manufactured by GEC Large Machines. They were installed and commissioned by GEC Engineering at Mondi Paper in Durban.

ALSTHOM NV and GEC General Products continuing to report to Stanhope Gate.

For a while it seemed that this structure would become entrenched, but at the end of September 1990 a new shareholders agreement was finally signed and a new company, GEC ALSTHOM South Africa Holdings (Pty) Limited, was formed, bringing to an end the discussions on whether the South African group should be permanently split into two separate businesses.

It was also a significant step towards ending a 12-month period of deep frustration for local management during which time no new (ALSTHOM) technology was allowed to become available, and indeed ALSTHOM continued to prosecute the local market, competing vigorously with GEC South Africa. The signing of the shareholders agreement brought this absurd situation to a close, and brought together all the people and businesses of the group under the new GEC ALSTHOM South Africa banner.

Small Motors Division based at Benoni had a long track record of being one of the group's largest and most profitable business units, but its design technology was becoming dated and, as a consequence, its motors were increasingly expensive to produce. Replacement technology was not available from within the group. In a move aimed at accessing modern technology and at the same time reducing excess manufacturing capacity, GEC ALSTHOM South Africa and Siemens merged their electric motor manufacturing businesses in 1992 with GEC ALSTHOM South Africa holding 67% of the equity in the new company. In 1996 GEC ALSTHOM South Africa acquired the 33% held by Siemens but agreement was reached which would allow the provision

The revolutionary locally manufactured C-Tran distribution transformer was launched by GEC in 1985.

Pouring molten iron at GEC Foundry in Springs to produce components for low voltage motors.

In 1984 Eskom ordered 45 000 house service meters from GEC.

of technology to continue.

By the early 1990s Barlow Rand had become a very large and diverse group of companies, but conglomerates were fast losing investment appeal. In 1993 Barlow Rand shareholders voted in favour of unbundling the group into four autonomous units, each one driven by common core competence.

Reunert Limited, a JSE-listed company of which Barlow Rand held 80%, was chosen to house the technology businesses, including the 50%-owned GEC ALSTHOM South Africa. The shareholders agreement was amended to accommodate this change, a development welcomed by GEC ALSTHOM as it viewed Reunert - a company that would focus on electronics, electrical engineering and telecommunications - as having interests far more closely aligned to its own.

In 1985 GEC acquired Elect Elements, seen here is an operator using a automatic spir winding machine.

GEC had a long standing commitment to training its people and in 1988 appointed a group training manager to oversee the groups training needs.

Reunert was to remain a JSE-listed company but, without the 80% holding of parent company Barlow Rand, the shares would become far more tradable and Reunert's performance would now come under the spotlight of the stock market. This brought a very significant challenge to the management of GEC ALSTHOM South Africa which was by far the largest contributor to Reunert's turnover but less of a performer when it came to profitability.

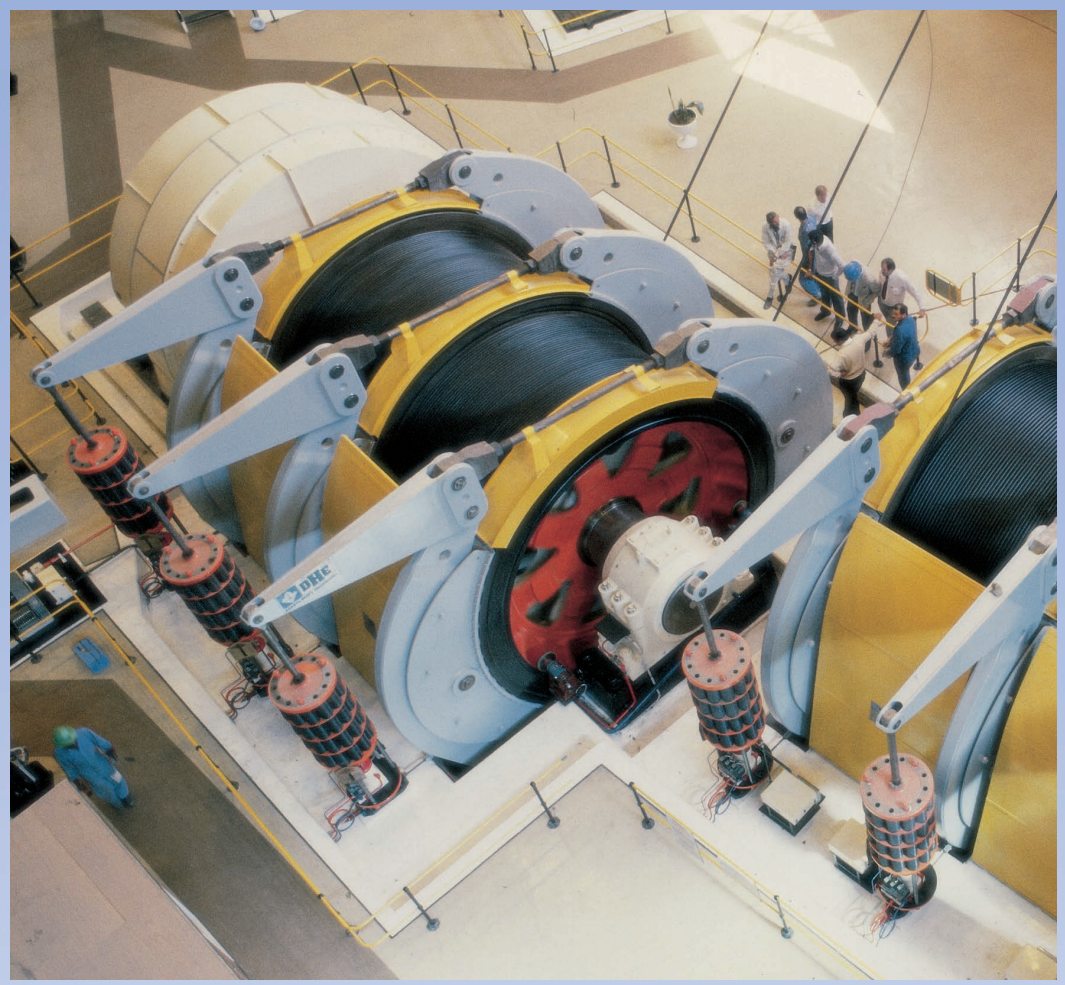
Perceptions of under-performance and the reasons for it were the subject of much debate, to the extent that at times it tested the strength of shareholder commitment to the company, but the strong relationship that existed between key personalities at the time held it together.

CHALLENGES AND OPPORTUNITIES IN THE NEW SOUTH AFRICA

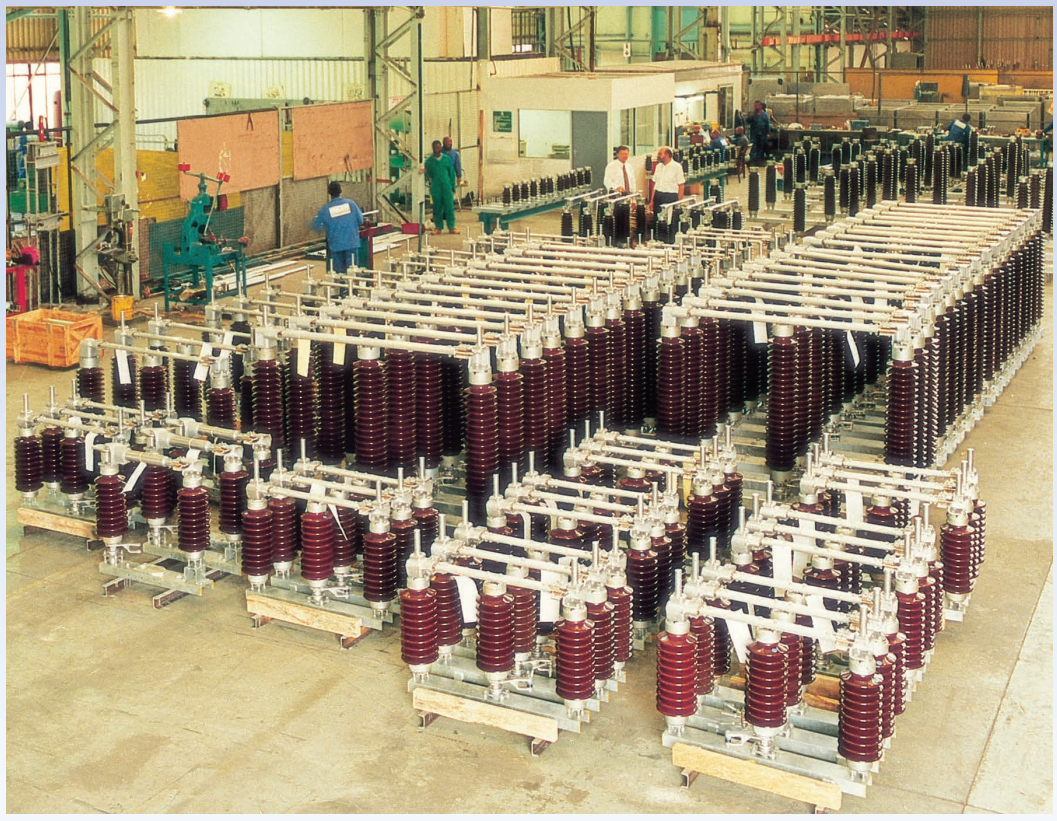
The early 1990s were characterised by depressed global economic conditions and weak markets, which would lead to a continuing concentration of the electrical engineering industry worldwide. Foreign investment in South Africa was at a virtual standstill and domestic fixed investment was at a low level.

Despite the difficulties the company faced in the early 1990s, the company 's core expertise in mine winder technology was still intact and the pinnacle of 100 years of accumulated achievement was probably reached in mid-1997 with the award of the contract by AngloGold for the two x 7MW electrically coupled cycloconverter man/material winder for Vaal Reefs No 11 shaft. The concept of this winder was developed by the company's engineers in conjunction with the mine to overcome a serious mining constraint in the underground man/material shaft. The adopted solution of an electrically coupled winder to operate in the main shaft, now deepened from 2 467m to 3 150 m, instead of sinking an additional sub-vertical shaft, enabled the mine to save millions of rands in capital expenditure and enormously improve logistical efficiency by transporting men and materials in one shaft rather than having to transfer to a second sub-vertical shaft system.

The technical requirements of an electrically coupled winder transporting men and materials to this depth in total safety, and the associated power systems, control and braking requirements, challenged the company's engineers to new heights of technical excellence, especially as the UK technical input was essentially limited to the supply of the induction



Electrically coupled BMR winder with 2 X 7 389 kW induction motors able to carry a 13 500 kg payload from 3 150 m at 19 m/sec installed at Vaal Reefs Gold Mine.



An array of high voltage outdoor disconnectors single and double side break types manufactured by High Voltage Equipment.

motors, thyristor converters and electronic hardware.

With a considerable excess in generating capacity, orders for new plant in the energy sector remained scarce although GEC ALSTHOM's huge installed base provided a steady revenue stream from orders for spares, servicing and refurbishment programmes. It was not a dissimilar story with traction, a field where very little funding became available for additional rolling stock or refurbishment programmes despite the fact that the fleet was ageing.

Without doubt, the best place to be in the market was power transmission and distribution (T&D), and it would remain that way throughout the 1990s and beyond. GEC ALSTHOM was particularly strong in this sector with an excellent portfolio of technologies and a major position in most European markets. Locally, the building blocks were in place for growth and expansion. Earlier, the organisation structure of GEC ALSTHOM South Africa had been aligned to that of the European principal to facilitate transfer of technology and co-ordination of marketing strategies. GEC ALSTHOM had terminated all distribution and representation arrangements with third parties, replacing them with formal agreements giving territorial exclusivity to the South African subsidiary. The local T&D activities, which were mainly based at the Knights site, contained many good businesses, but there were also weaknesses and gaps in the product range. Medium voltage switchgear that had been in difficulties for most of the 1980s was now very much back on its feet and highly successful. This was extremely important, not only because switchgear was the largest unit in T&D, but also because it influenced the performance of surrounding business units such as minisubs,

Refurbishment of traction motors at Repair Services in Driehoek.

High Voltage Equipment has won the Eskom contract 132 kV isolators on numerous occasions.

protection and control, and distribution transformers.

The prevailing harsh market conditions allowed GEC ALSTHOM South Africa to take advantage of a number of acquisition opportunities in the 1990s. Notable amongst these was the purchase of Cullinan Power Projects in 1994, aimed at expanding the scope of T&D and Projects Division to include power systems, overhead transmission lines, cabling and high voltage isolators. Following similar moves in Europe, the local interests of AEG's drives and high voltage switchgear business were purchased in 1995. These two acquisitions were ex-

ALSTHOM acquired full control of SPRECHER Energie in 1992 and today enjoys a very strong position in the high voltage switchgear market, including a comanding position as the supplier of gas insulated switchgear (GIS).

Switchgear panels are designed and assembled by Alstom staff at the Knights manufacturing plant.

tremely important as they coincided with the transfer of SPRECHER Energie distribution licenses from a third party to GEC ALSTHOM South Africa. For many years SPRECHER had held a very strong position in the local market and, together with the addition of Cullinan and AEG, GEC ALSTHOM South Africa quickly became a leader in high voltage equipment and power systems, much of which was outdoor sub-stations, but SPRECHER also offered a world class range of GIS gear which was steadily gaining market acceptance in South Africa. In 1999 Conelectric, a local company whose main business was in high voltage outdoor current and voltage transformers was purchased - again adding another string to the bow of T&D Division.

The only two significant gaps remaining in the T&D portfolio were power transformers and low voltage switchgear. The market for power transformers had been researched many times by GEC ALSTHOM South Africa management, but it was a market that was adequately supplied by a few well-established players. Studies showed that a green fields entry would be a costly, bruising exercise and the end result would have been market oversupply.

Meanwhile, the NEI group in the UK was going through difficult times that resulted in the group gradually being dismembered with many divisions being sold or closed in the early 1990s. This had the effect of leaving parts of the South African group without ongoing technology provision and an uncertain future. GEC ALSTHOM South Africa eyed the situation with a great deal of interest as NEI Africa had a number of good businesses that would complement the group's activities, particularly in the core T&D Division. But there were potential problems; NEI also held significant market shares in medium voltage switchgear through Reyrolle, and minisubs through Power Engineers, and it was thought competition authorities would never allow GEC ALSTHOM South Africa to gain yet more market share in these two activities through acquisition. NEI was a willing seller, but would only entertain package offers for the entire local group. GEC ALSTHOM South Africa put together a consortium offer that would result in the entire NEI Africa group being acquired, with Reyrolle

Switchgear and Power Engineers being purchased by third parties. This arrangement met all regulatory and shareholder conditions and the deals were signed in April 2001.

Among the businesses retained were Bonar Long, one of the long-established players in the power transformer market; Cutler Hammer in low voltage switchgear; John Thompson Africa in industrial boilers; and Meissner Power Systems, who specialised in uninterruptible power systems. The NEI acquisition was a sizeable and highly successful deal for GEC ALSTHOM South Africa.

There were other smaller, but very important, acquisitions as the electrical engineering industry consolidated. In railway signalling the acquisition of Westech (in 1995) and Telkor Signalling (in 1996) started the re-building of the group's railway signalling business, and GEC ALSTHOM South Africa is presently the largest supplier of locally manufactured signal products in southern Africa. In Appliance Components, the acquisition of Wireohms, Strix, Heating Element Engineering and Keval added to what was already a very large and highly successful division.

The lifting of economic sanctions in 1991 resulted in an increased level of both export and import trade, with many new entrants coming into all sectors of the local market, although political uncertainty lingered on. This was largely swept aside by the successful first democratic election in 1994, which brought a wave of optimism to the country and a heightened level of confidence to overseas trading partners and investors. Obviously the country would need to go through a major process of adaptation and transformation, but the immediate post-election challenge was

The 100 t/h John Thompson cornertube boiler at the Caltex refinery in Cape Town.

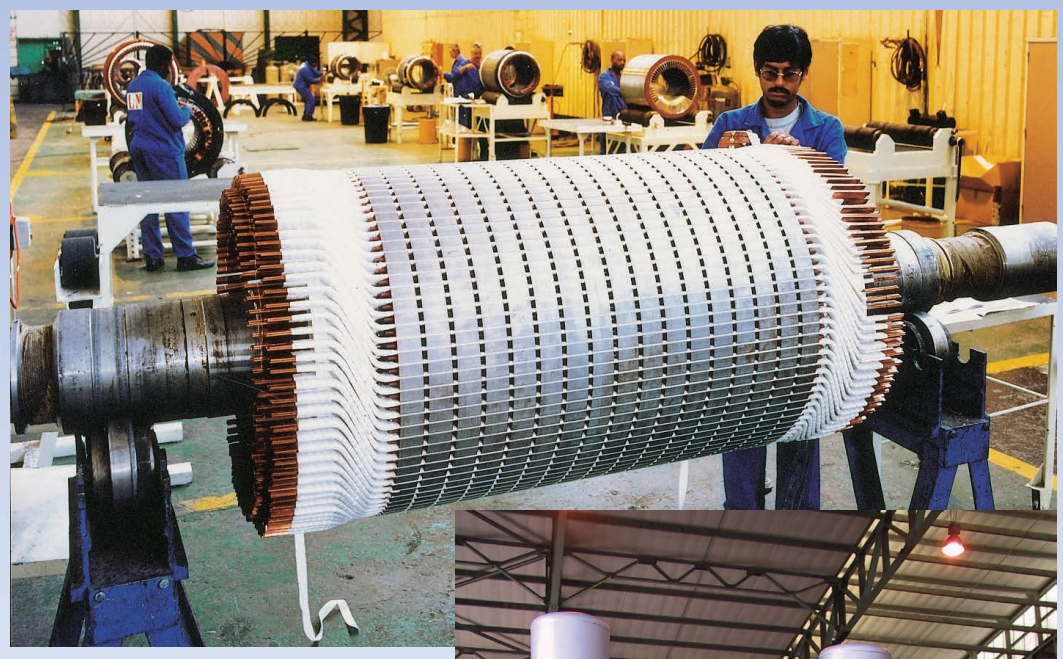
Engineers of Foster Wheeler South Africa, main contractors for the Temane Pande project, and Switchgear's engineers' do a final check of the 16-panel SBV4 switchboard.

national reconciliation to heal the scars and divisions of the past. The new South Africa took its place in the world community and re-affirmed its position as the economic powerhouse of sub-Saharan Africa.

South Africa was the natural and preferred trading partner for most countries in this region and the doors were now open for business. Multinationals quickly identified the opportunity and reshaped and strengthened their South African operations to cover the much larger regional markets from a Johannesburg base. Multinationals that had entered into partnerships with local groups many years earlier began to question the need for arrangements that may well have suited the years of isolation but were hardly necessary now. Such partnerships had become weakened as a result of the changed political dispensation, and were fast outliving their usefulness. Besides, there was the growing need to bring black partners into the ownership structure, and for GEC ALSTHOM South Africa this was clearly the way forward.

Mark Wilson was appointed group managing director in September 1996 after a number of years moving up through the company's ranks. Wilson could see that the unfolding political scenario in the new South Africa would have a dramatic impact on the way business had traditionally been conducted, and was still being conducted. The public sector was already changing fast and the government would accelerate the pace. Socio-economic change was forging ahead and the government made clear to the entire business community that a change of direction was necessary to ensure greater participation of previously disadvantaged groups and individuals in the economy. Equity employment and black economic

A range of distribution transformers being loaded for transport to Zambia in November 2002.



An Electrical Machine's technician doing final taping on a large motor core.

Mark Wilson standing next to 132 kV Current transformers.

empowerment were issues high on the agenda, and it was quite clear the government intended using the enormous purchasing muscle of the state through provincial governments, municipalities and parastatals to spearhead empowerment initiatives aimed at bringing change to the private sector, where most of the country's economic wealth was generated and held. For GEC ALSTHOM South Africa, a company heavily dependent on state spending, the choices were clear, the necessary changes would be profound and speed of action was of the essence if a potentially serious problem was to be converted into a golden opportunity.

The change programme started by detailing a comprehensive black economic empowerment (BEE) policy and a task team was detailed to formulate strategy and a way forward. In 1998 GEC ALSTHOM South Africa formed three new jointly owned companies with various empowerment groups, companies which were active in the fields of transformer repairs, projects and product distribution.

Also in 1998 Alcatel and GEC announced they would each reduce their shareholding in GEC ALSTHOM to 24%, allowing the remaining 52% to be available for a public listing. Coinciding with the planned listing, the name of the company would be changed to ALSTOM. The listing went ahead on the Paris, London and New York Stock Exchanges in 1999.

In light of the changing circumstances, Reunert also began to re-examine its 50% interest in ALSTOM South Africa, recognising that its ability to add value to the business was diminishing. Deregulation and globalisation strongly suggested the interests of ALSTOM South Africa would be best served if management responsibility for the group were to

Kgorong Investments acquired 12% of the equity of a subsidiary of ALSTOM South Africa in July 2001. Seen at the signing ceremony are (from left) Mark Wilson (Managing Director ALSTOM South Africa), Letepe Maisela (Chairman, Kgorong Investment Holdings), French Minister [then] Trade and Industry and Mr Alec Irwin [then] (Minister of Trade and Industry).

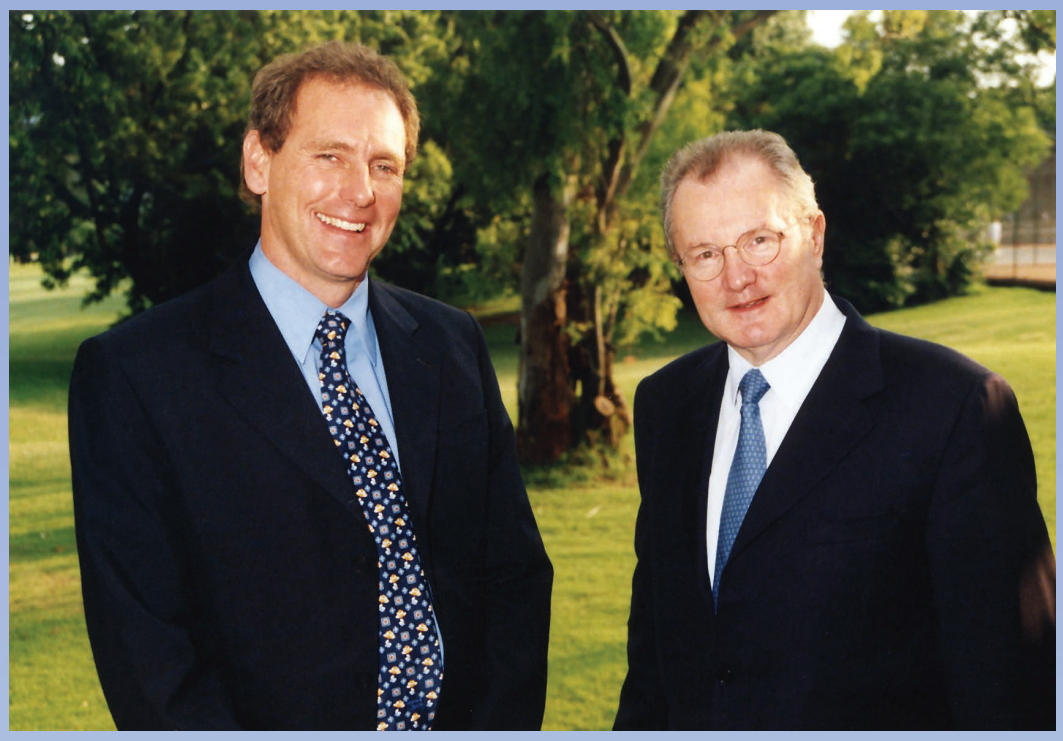
The press conference announcing the formation of ALSTOM SA (Pty) Limited in July 2002, with no change in the operational management or in the operational structure of the original company.

be back in the hands of its technology provider. In October 1999 Reunert sold its 50% stake to ALSTOM NV, thereby severing ties that had commenced in 1978. For a short time, ALSTOM South Africa became a wholly owned subsidiary of its European principal.

By the end of 1998 the BEE task team, which had worked closely with Eskom, had developed an empowerment strategy that covered four key areas:

- Equity: The transfer of equity to previously disadvantaged groups
- ALSTOM employees: Management development skills training/ transfers
- Procurement: Support for local black suppliers and community-based sub-contracting; and
- Business development and social responsibility: Supporting black economic entrepreneurial initiatives.

The shareholders fully understood



ALSTOM South Africa chief executive Mark Wilson (left) with ALSTOM CEO and chairman Pierre Bilger.

Large Motors production line at Electrical Machine's Benoni factory.

the need for change and supported local management's strategy, but of course it would mean giving up equity.

These initiatives from South Africa came at a time when ALSTOM itself was undertaking an intensive review of its worldwide operations and structures. From this review it was decided to accelerate the sale of all non-core and non-essential businesses, leaving the group to focus on its three core divisions Energy, Rail Transportation and Power Transmission and Distribution. For ALSTOM to build further on its already strong South African market presence in these three sectors, it defined a strategy would have to be built around six key objectives:

- Remaining highly active in the market with the ability to trade major projects directly from Europe if necessary;
- Strengthening the ALSTOM brand name;
- Extending the reach of ALSTOM technologies;
- The support of an empowerment partner(s);
- Access to a low-cost manufacture/services base in the territory; and
- A strong, stable local management team.

If these objectives could be met it would not be essential to own the entire equity of the local subsidiary and, indeed, it would not be possible to retain 100% ownership under the unfolding South African scenario. The door was now open for major change and for ALSTOM to accelerate implementation of the empowerment strategy it had devised some two years earlier.

In July 2002 a new legal entity, ALSTOM SA (Pty) Limited, was formed. The new entity included all existing business units in South Africa, with no change in the operational management or in the operational structure.

Wilson had realised his ambition of bringing together the four key stakeholders - the technology provider, economic empowerment partners, management and finance providers, into the ownership of the new entity.

The second half of the 1990s had seen further sharp reduction in world demand for power plant equipment with the exception of China and, despite some industry restructuring 10 years earlier, there were still vast excesses of capacity, particularly in Europe. The market was also changing with a marked shift away from fossil fuel plants with their long

build times and environmental problems. Gas turbines, with their much higher efficiencies and shorter build times, were rapidly gaining market favour. This was not a particularly welcome development for ALSTOM as much of their gas turbine technology was licensed, bringing with it a number of restrictions. Intense competition to gain market position resulted in gas turbine designs stretched to the limit to increase plant efficiency, as this was often the key criterion in tender evaluation.

In a major industry restructuring move ABB and ALSTOM decided, in 1999, to merge their power plant activities into a jointly owned company to be based in Brussels. The new company, ABB ALSTOM Power, became the world leader in the supply of power plant, but the company was not without its problems and after approximately
18 months ALSTOM acquired ABB's 50% stake. The company became a wholly owned ALSTOM subsidiary and ABB exited the energy sector. In later years this business venture, which had seemed to offer so much potential at the start, was to turn around and bite badly, causing immense damage to ALSTOM. There were problems with gas turbines that failed to meet guaranteed efficiencies and problems with asbestos-clad boilers, which brought serious litigation challenges on health and environmental issues. These were costly problems to resolve - costly in terms of money, of absorption of senior management time, and costly in terms of loss of stock market confidence. Fortunately, none of the problems directly affected the South African operation; in fact, just the opposite as the move allowed ALSTOM South Africa to integrate the activities of ABB ALSTOM Power into its Energy Division.

Final assembly Q.C inspection of two 1000kVA 11/0,4kV transformers prior to dispatch from Distribution Transformers' yard in Knights.

Erection of train signals at Durban North.

Faced with losses and a mounting pile of debt, ALSTOM had little choice but to draw up a list of asset disposals, the most important of which was the highly successful Power Transmission and Distribution Division (T&D). This caused considerable consternation in South Africa, as the local T&D was also highly successful and heavily dependent on its principal for technology. If T&D were to fall into hostile hands it would be a near disaster for ALSTOM South Africa. In January 2004 ALSTOM's T&D Division internationally was purchased by AREVA, previously Framatome, with whom ALSTOM had long-standing links. This was widely welcomed by local management who were quickly able to transfer technology licensing and distribution agreements over to AREVA. At the same time AREVA took over half of ALSTOM's equity stake in the local company, thereby further cementing the relationship with ALSTOM South Africa. In every way AREVA was now a very important stakeholder in the local company.

Technicians re-insulating some of the 60 MW Roebel-type generator bars at Repair Services' factory. A completed bar is seen in the foreground.

The last five years had been hectic for ALSTOM in terms of corporate activity both locally and overseas, but in the marketplace ALSTOM South Africa had enjoyed buoyant trading conditions. Increased political stability and confidence provided the platform for economic growth after a long period of stagnation. The many acquisitions of the 1990s were proving to be very successful and economic empowerment initiatives were already starting to deliver very real benefits. In 2003 and 2004 ALSTOM South Africa delivered excellent results.

Transformer core winding taking place at Distribution Transformers.

AT THE START OF THE NEW CENTURY

South Africa has changed dramatically since the British General Electric Company first set up business in Cape Town in 1903, and the pace of change accelerated as the century unfolded. The company has survived many very difficult challenges, but today ALSTOM South Africa is optimistic and confident about its future.

The high level of fragmentation that characterised the industry for the first 60 years has virtually disappeared, and today a few large companies dominate the power electrical engineering sector in South Africa. Similarly, the customer base has changed with the 450-plus municipalities, each with a substantial degree of purchasing discretion, largely being swallowed up for purchasing purposes by a much smaller number of metropolitan authorities. This may well change again in the years to come when the six planned Regional Electricity Distributors come into being.

Having spent the major part of the past 100 years building a company that is heavily dependant on government spending, be it through provincial governments, metropolitan councils, municipalities or parastatals, it required inspired leadership to define and implement the economic empowerment initiative which proved ALSTOM South Africa was ready, willing and able to embrace the changes required of it in the new South Africa. The inclusion of economic empowerment partners into its ownership structure was not just to protect the company's exposure to government spending, although its position there has undoubtedly been enhanced, but, of equal importance, it has positioned ALSTOM South Africa in line with mainstream thinking that the economic wealth of

Balmoral College is a school adjacent to ALSTOM South Africa's Knights site and has become the company's chief social responsibility project. ALSTOM is assisting this underprivileged school and in doing so is helping to uplift the local community.

Durban North substation installed by Power Systems.

the country must be shared and expanded. The empowerment model that ALSTOM South Africa devised is perhaps one of the best in the country and management continues its effort to build and improve upon it.

ALSTOM South Africa enjoys the full support of ALSTOM and AREVA, its two key technology providers and commercial partners, based in France. Both recognise that the newly structured local company is best positioned to enhance their interest in the territory and have very optimistic views on South Africa's future. The major contribution made by the GEC/ALSTOM/AREVA companies to the South African infrastructure over the past century, and the huge legacy of equipment in the installed base, suggests there will be a need, and an opportunity, to ensure that equipment is serviced, maintained and upgraded.

The role played by the group's companies in the development of the mining industry in South Africa cannot be overstated, particularly in the field of mine winders and hoisting equipment, where the contribution made has been truly impressive. During the past 80 years more than 600 mine winders have been supplied, many of which are still in operation today. Further, for many years GEC companies provided a monthly winder inspection service for the industry; technicians carried out an independent safety audit on more than 400 winders, during which all safety and control devices were monitored and tested and the general condition and standard of maintenance was checked and reported on. This procedure made an extremely valuable contribution towards safety of operation of winding plant over many years. It is a great tribute to all GEC companies and their people that the mining industry placed so much trust in them for

The complete array of 400 kV series capacitor banks installed by Power Systems at Luckhoff in the Southern Free State.

Electrical Machines Division is the market leader in the manufacture of large electric motors in South Africa

A Woods Fans' quality inspector stands inside a 2,24 m diameter cylindrical silencer which is to be coupled to the 224J2 two-stage contra-rotating ventilation fans.

equipment where safety and reliability of operation is of such prime importance.

After a hectic 20-year period of building new power stations, followed by an equally quiet 20 years, it appears that excess power generating capacity is steadily being expunged, and additional capacity will be needed in the foreseeable future. This may see the introduction of independent power producers, or perhaps public-private partnerships for the first time in the energy sector. Similarly, prospects look brighter for increased spending on railway rolling stock to upgrade a rapidly ageing fleet, and to expand capacity where it will support export of South Africa's minerals to best take advantage of the surge in world demand for commodities. The country's main ports and harbours are likely to attract substantial new investments, partly to increase capacity but also to upgrade technology, which suggests there may be opportunities for private sector intervention, particularly if new partners are able to introduce modern technology and port-management expertise. The Reconstruction and Development Programme and various other government initiatives aimed at improving service delivery will almost certainly ensure strong demand for the products and services offered by T&D Division, suggesting that T&D will probably remain at the core of the company's activities for many more years.

The first development at Coega, other than the harbour, has started with the building of the Well's Estate construction village, Power Systems was awarded the electricity supply centract.

Equipment installed at Coega's Leaches Bay substation (from left): A 20 MVA 132/11 kV OLTC power transformer, 132 kV lightning arrestors, 132 kV current transformers, 132 kV SF6 circuit breakers, and 132 kV isolators with electrical droppers from overhead busbars.

Today, ALSTOM South Africa is in strong, reliable hands. A team of young, highly talented individuals who have worked well together for more than seven years have brought a great deal of management stability to the company. An open-minded, flexible and unbureaucratic style has brought a willingness to try new approaches to managing all aspects of the company's business, without fear of failure. Senior managers have demonstrated their commitment and confidence in the company's future by acquiring a meaningful equity stake for the first time.

At the beginning of this brochure, tribute was paid to the quality and character of the people the company has been able to attract and retain. They have been the backbone of the company throughout the past 100 years and remain so today as foundations are being laid for the second century. Ultimately it is, and will always be, the people who work for the company who make it successful - ALSTOM South Africa's highly qualified, enthusiastic and motivated employees.

COMPANY PROFILE

ALSTOM South Africa (Pty) Ltd employs 4 500 people and has an annual turnover in excess of R3bn. It has 25 operating units, including two empowerment subsidiaries, 19 production facilities and 21 distribution centres throughout the region. The group also has exclusive distribution, technology and representation rights in agreed areas of activity for ALSTOM and AREVA in southern Africa.

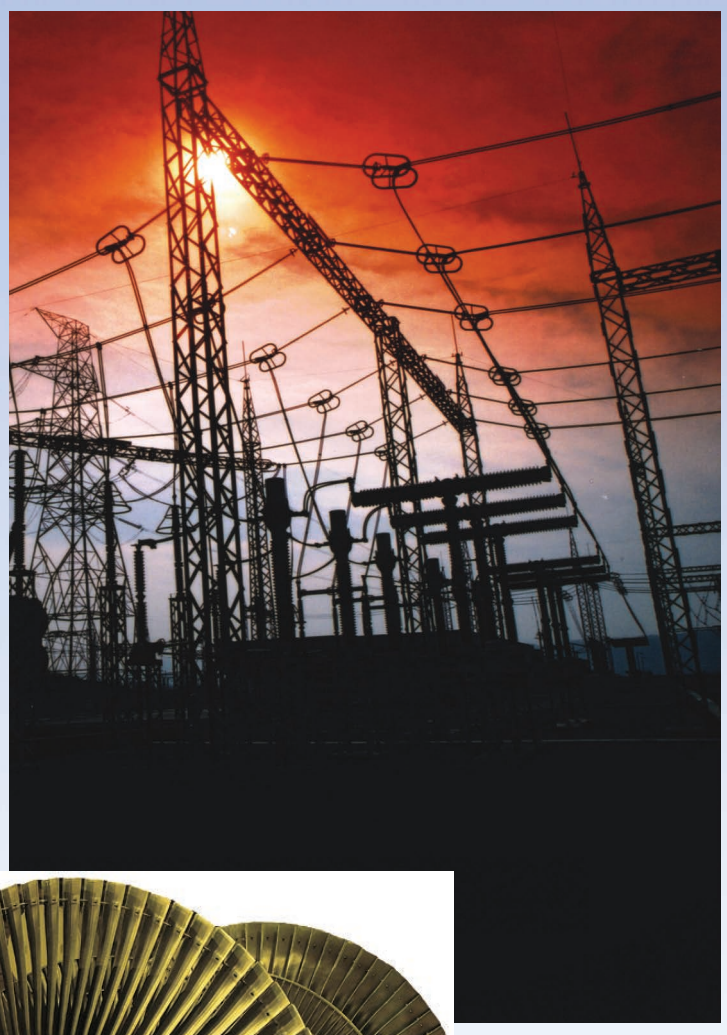
ALSTOM South Africa manufactures electric motors, foundry products, isolators, transformers, minisubs, switchgear, circuit breakers, instrument transformers, protection equipment, axial flow and inline fans, railway signalling products, heating elements and controls for appliances. It undertakes turnkey projects in substations, signalling and traction systems. The company also distributes various electrical products, diesel engines, industrial brakes and clutches.

The Power Division, incorporating John Thompson Boilers, supplies and services steam, gas and hydro turbine generation equipment, including boilers, environmental control and fuel milling plant. Over 80% of the installed turbo-generator capacity in South Africa, as well as more than 30% of the utility boilers and 25% of coal-milling plant, have been manufactured and installed by ALSTOM Power, while John Thompson Boilers has supplied the majority of municipal and industrial turbo-generator plant and more than 80% of industrial watertube and firetube boilers.

The Transmission & Distribution Division (T&D) supplies a full range of equipment, systems and services for the safe and efficient transmission and distribution of electricity at all power levels, from

ALSTOM South Africa Today

Transmission & Distribution supplies a full range of equipment, systems and services for the safe and efficient transmission and distribution of electricity at all power levels.



Turbine blades of Unit one installed at Majuba Power Station.

the generator to the end-user. T&D, which has developed a comprehensive capability to undertake turnkey projects, including design, installation, commissioning and maintenance, is the exclusive representative of AREVA in southern Africa, selling products and services branded ALSTOM if they are produced locally, and AREVA if imported. T&D's products and services include high, medium and low voltage switchgear, power and distribution transformers, protection and control equipment, uninterruptible power supplies, and automation solutions. The division comprises the following companies and units: High Voltage Equipment, Power Systems, Power Transformers, Distribution Transformers, Switchgear, CHI Control, Meissner and Protection & Control.

High Voltage Equipment manufactures and supplies high voltage circuit breakers, instrument transformers and isolators; Power Systems project-manages the construction of medium and high voltage substations; Power Transformers manufactures and supplies power transformers; Distribution Transformers manufactures and supplies distribution transformers; Switchgear manufactures and supplies medium switchgear and minisubs; CHI Control supplies low voltage motor control gear components, systems engineering and panelbuilding; Meissner manufactures and supplies uninterruptible power systems and associated equipment; and Protection & Control manufactures and supplies protection, control and metering schemes.

The Transport Division, which has been the dominant supplier of electric traction equipment for locomotives and motor coaches in South Africa, has a comprehensive turnkey capability in the fields of railway automation, signalling and control system and traction

Employees at Railway Signalling working on a new railway signalling system.

Transport Division has a comprehensive turnkey capability in the fields of railway automation, signalling and control system and traction equipment repairs.

High voltage current transformers being filled with oil at High Voltage Equipment's factory in Knights.

equipment repairs. It comprises Railway Signalling, which undertakes design, manufacture and installation of railway signalling systems; Transport Equipment & Projects, a contractor and supplier of traction propulsion systems, locomotives and rolling stock; and Repair Services, which repairs and refurbishes rotating machines, locomotive traction and auxiliary motors.

Technicians at Repair Services put the finishing touches to the salient pole rotor from Swaziland's Magadusa hydro-electric power station.

The Industry & Contracting Division comprises Industry, the group's system integrator, undertaking turnkey projects for the electrical power, mining and manufacturing industries, as well as for public sector infrastructure; and Contracting, a specialist electrical and instrumentation contractor to a number of industries.

The Electrical Machines Division is the market leader in the manufacture of electric motors in South Africa and exports to several countries. It consists of Large Machines, which designs, manufactures and supplies medium voltage rotating electric motors; Laminations, which manufactures and supplies laminations and tooling; Low Voltage Motors, which designs, manufactures and trades a complete range of industrial low voltage motors and alternators; Elmacast, a one-stop foundry, manufacturing high quality castings; and Contact Engineering, manufacturers and suppliers of commutators, slip-ring assemblies, electrical contacts and flexible connectors.

The Electrical Equipment Division comprises Mechanical Equipment, which manufactures and supplies fans, diesel engines, clutches and brakes; and Siyakha which provides the group's extensive branch network, ensuring ALSTOM representation and service in southern Africa.

In 2004 Woods Fans increased the range of their ventilation fans to 2,5m diameter. An order for these new 2,5m units, driven by 350kw motors supplied by Large Machines, was placed by Anglo Platinum for their Amanderbult Mine, near Rustenburg.

The Appliance Components Division comprises Electric Elements, suppliers of domestic and industrial heating elements; and Satchwell Controls, suppliers of temperature controls.

To meet Africa's particular needs ALSTOM South Africa has embarked on an ambitious programme to develop people from within its ranks. It has created opportunities for members of its staff to start their own businesses and initiated joint ventures with previously disadvantaged individuals possessing skills in manufacturing, engineering and project management.

ALSTOM South Africa's BEE joint-venture subsidiaries are Revive Electrical Transformers, which manufactures and repairs distribution transformers and associated equipment; and Koebec, a specialist company that provides electrical and instrumentation installation services at Koeberg nuclear power station and other facilities in the Western Cape.

From July 2002, other empowerment groups acquired equity and by 2004 black economic empowerment partners held 38% of the company's equity - the ultimate target being a BEE shareholding above 50%.

The following books and material where used for reaserch:
GEC: Its history, structure and the future
GEC in South Africa: 1903 - 1953
Metropolitan Vickers Electrical Co. Ltd: 1899 - 1949
BTH Reminsces Sixty Years of Progress, Early Histories of Some Companies of the English Electric Group
The English Electric Co of South Africa (Pty) Ltd
Brochure: First Electric Corporation
Brochure: L H Marthinusen
Anatomy of a Merger
Sparkling Years: SAIEE
A Symphony of Power, the Eskom story

ALSTOM South Africa (Pty) Ltd 2 Magnet Road, Knights 1413 P.O. Box 13024, Knights 1413
Tel: (011) 820-5111 Fax: (011) 820-5100 www.alstom.co.za