HACKBRIDGE & HEWITTIC ELECTRIC Co LTD

In the previous article (see issue) the history of this Company since the turn of the century was recorded and now reference will be made to the products they developed.

Firstly it must be stated that the labour force was very stable having been gathered together from a wide area and at the closure many had been there 30, 40 and even 50 yrs. There had been three ~~Chairmen~~ Managing Directors, William Walter Hughes, Tom Lister and finally Tony Browne, all top class engineers and real characters.

HACKBRIDGE

They covered the whole range of transformers from a few VA up to 1000 MVA and up to 400 kV. In addition on load tap changers, reactors, static balancers and arc suppression coils were supplied.

The principal adopted was to manufacture everything themselves as far as possible so that they were only dependant on outside suppliers for the raw materials such as core steel, steel plate, copper, oil etc: This meant core cutting and annealing, tank making, copper covering and even some oil was re-conditioned, which all called for a lot of capital plant.

Within the industry the HACKBRIDGE design and construction methods were acknowledged as top class and many firsts were established. Unit construction on larger ~~transformers~~ transformers was adopted where primary and secondary coils were clamped between robust steel end rings held together by steel tie bars, fully pre-shrunk insulation being used, so eliminating adjusting screws or spring devices which had previously been considered essential. This construction afforded exceptional strength to withstand surge and short circuit stresses. At 33 kV and above static end rings were provided with end turn insulation arranged to grade capacitance between turns to control voltage gradient under surge conditions. As a result C.E.B. impulse tests were passed without a serious failure whereas other manufacturers ~~where~~ were having great problems ~~in~~ during the period 1950 – 1970

In the mid 1940s HACKBRIDGE supplied for Barking "B" Power station 4 - 93.75 MVA 12.5/33 Kv oil forced water cooled transformers plus various other transformers up to 10 MVA each which at that time was amongst the worlds largest installation. Water cooling became a speciality and as a result many plants for Hydro Electric schemes were commissioned all over the world.

Many millions of KVA were manufactured over a period of nearly 50 years and a high proportion (perhaps averaging 50%) went overseas. Certain areas were worked on very hard - notably Hong Kong, Canada and India and in fact a manufacturing facility was established in Madras to combat import control. An active set of overseas agents was built up who were payed on results and encouraged by regular visits from management. In fact so strong was the back-up from Hersham that the Export Sales Manager spent 2½ years in Calcutta setting up the organisation in India (Thus in 1950 the author joined the company to take his place)

In addition to the large generator and distribution transformers which were oil immersed but artificially mixed forced cooled, there were also naturally cooled units up to about 20 MVA. The emergency rated transformer was a development in the U.K. to cover unexpected overload conditions such that with a naturally cooled rating of say 20 MVA by the switch on of pumps to force oil ~~the rating could be ...~~ and ~~...~~ by adding fans onto radiators ~~...~~ 30 MVA could be obtained.

Of course HACKBRIDGE had been developing a complete range of transformers to cover the whole market including:-

(1) Small power up to 50 KVA - air, oil, non-inflamable fluid
(2) Distribution - 3 phase up to 1000 KVA standardised range.
(3) Rectifier supply up to 10 MVA with heavy current secondaries
(4) Combined transformer and switch units - HV and LV switchgear
(5) Hermetically sealed - top hat type, seal below fluid level.
(6) Pole and platform mounting for rural distribution.
(7) Buried type in various forms both air cooled and fluid cooled
(8) ~~Ins~~ Instrument transformers for voltage or current measurement.

(9) Dry type with various insulation and temperature levels
(10) A.C. Static Balancer. This ~~was~~ interstar connected, installed near the load to eliminate voltage drop in the neutral due to unbalanced lodding. Permissable loading of feeders could be increased by as much as 50%.
(11) Arc Suppression Coils (Petersen coils). Connected in the neutral and tuned to line characteristics to reduce earth fault currents and power arc at fault point.
(12) Current limiting reactors air cored ironclad with laminated magnetic shield protection.

Such was the power, range and success of HACKBRIDGE transformers

HEWITTIC

The two main products were mercury vapour lamps and glass bulb rectifiers

The mercury vapour lamp was pioneered by Peter Cooper Hewitt and was manufactured for over 50 years. Its principal use was for industrial lighting, studio lighting, engraving, printing and photographic enlarging. Tubular lamps from 4 to 53 inches long giving light output from 100 to 5000 candle power were made ~~giving~~ having exceptionally long life with high efficiency.

Glass Bulbs, made of "PYREX" glass, having 1, 2, 3 or 6 anode arms (4 8 12) giving a range in current of from 10 amps to 500 amps ~~per bulb~~ each were used. A 12 arm bulb was developed but was discarded as it had little advantage over other combinations. The bulbs could be free firing or have grids fitted to control the flow of electrons and output variation. The cathode mercury pool was in the base of the bulb and anode arms projected around the side either straight, up to about 110 v DC, or cranked for higher voltages to prevent back firing. The length of the arc path was important because it effected the efficiency – say 20 volt arc drop at 750 v DC down to 12 volts at 110 v DC. About 1960 a new type of glass bulb was developed which had a metal base incorporating a annular molybdenum ring to which the arc spot was anchored.

This reduced the arc drop by about 30% giving ~~a~~ much greater efficiency and a smaller condensing chamber for the mercury, therefore reducing the overall dimensions. Thus the glass bulb rectifier continued to be very competitive ~~with~~ against the steel tank type. The metal bottom glass bulb was more susceptible to back-fire because of the increased forced air cooling on the base but this problem was overcome eventually. Unfortunately its considerable advantages were overtaken by the developement of solid state rectifiers in the mid 1960s

The glass bulb rectifier was easily assembed into groups to keep dimensions equitable with steel tanks and one of the most popular arrangements was four 3 arm bulbs in a 4 ft 6 in square cubicle which could be double tiered if necessary. Special arrangements could be made to fit virtually any site requirement as for instance on British Rail a 2500 kw 750 v set had 16 bulbs four tiers high with one common cooling fan plus all the auxiliaries such as exciter transformers, anode chokes, anode fuses etc in a separate compartment on one side. Hewittic built the largest glass bulb rectifier in the world in mid 1940, in Canada, delivering 10,000 A at 875 v comprising 48 bulbs paralleled on one transformer.

Extensive orders were obtained in USA and Canada in the 1940-1960 period for mining and traction supplies and as a result a glass bulb manufacturing facility was set up in Canada staffed by personnel from Hersham.

Some engineers had been suspicious of glass having come to associate heavy engineering with massive metal construction. Good practice demands the selection of the most suitable material for a particular task and glass was the ideal material at that time being completely vacuum tight and making a perfect simple seal with tungsten and molybdenum conductors. During the war the resistance of glass bulbs to bomb damage from blast and vibration, even to equipment only a few yards from the bomb crater, was amply proved in the blitz in London on the Underground System.

Many large traction contracts were obtained from all over the world and some were complete projects including dismantling and removal of old equipment and installation of new plant, including switchgear, stage by stage. Some contracts started with mercury arc glass bulb equipments and changed to silicon during the run of the contract. London Transport and British Rail, Southern Region placed many orders during the modernisation of power supply from $33\frac{1}{3}$ or 25 HZ to 50 HZ and contracts for up to 50 equipments per stage were received.

During the mid 1950s Hewittic developed their own germanium and silicon diodes proving again that they would not rely on outside suppliers. In 1952 from a bottle of germanium dioxide a metal was formed, zone refined and crystal grown from which a working slice was cut in 1955. All very basic but starting from scratch. Early on it became apparent that silicon had many advantages and about 1960 work started with a fresh team and new plant, until plenty of 125 A 1500 v devices were available.

From about 1955 a drive started to get business in USA and Canada for traction rectifiers, capitalising on natural air cooling with the minimal number of gadgets. This was foreign to the North Americans and it needed a "hard sell" but this was eventually accomplished. Orders came in from places like Toronto Boston, Cleveland, Chicago, Philadelphia and finally the big one Long Island Rail Road for 66 equipments.

The story is now brought up to the arrival of English Electric in 1967. Upon forming the new E.E.H.R the traction work at Hersham was increased and medium and high power equipment moved to Stafford. With the take-over of GEC additional traction projects were taken on.

Upon the closure of Hersham in Dec 1971 all outstanding work had been transferred to Stafford during an overlap period of some months with the collaboration of all concerned and a few engineers likewise moved to Stafford.

So the name HEWITTIC passed away but the memory lingers on.