Chapter 4

THE EASTAUGH ERA

PROFESSOR FREDERICK ALLDIS EASTAUGH A.R.S.M. F.I.C.

F.A. Eastaugh was born in 1882 in England. He first joined the staff in 1907 as an Assistant Lecturer and Demonstrator in Chemistry and Assaying in the Department of Chemistry, University of Sydney. He became a Lecturer and Demonstrator in 1916, an Assistant Professor in 1921 and Associate Professor of Engineering Technology and Metallurgy in 1926. He was Professor of Engineering Technology from 1938 to his retirement at the end of 1947.

He died in England at the village of Brent-Eleigh in 1969, aged 87. On his retirement in 1948, the School of Engineering Technology became the Department of Chemical Engineering.

From a letter written in 1921 by J.W. Edgeworth David, KBG, CMG, DSO, FRS Hon D.Sc Oxford and Manchester, Professor of Geology, University of Sydney (Archives University of Sydney) we learn:-

"He gained his Associateship of the Royal School of Mines London, with First Class Honours in 1903, and had meanwhile passed the London Intermediate B.Sc, examination. He was awarded the Edward Matthey Prize for research on the Aluminium Alloys devoting his attention specially to the crystalline and micro-crystalline structures observable in such alloys, a branch of Metallurgy of growing importance.

In 1904-5 he became lecture demonstrator to Professor Gowland F.R.S., in his teaching, examinations and research, and assistant to Mr G.T. Holloway, Metallurgist of Chancery Lane, London in analysis, chemical manufactures and work tests; and in 1906 was assistant manager to the Edison Ore-Milling Syndicate.

In 1892 the University had made provision for the teaching of mining and metallurgy and in 1894 the School of Mines opened.

In 1907 he was selected out of a number of applicants to take charge of Assaying, Practical Metallurgy and Engineering Chemistry at the University of Sydney. He came to us with a high reputation not only as a scholar but also as an athlete, having been an International player in Association Football for his Old Country against France in 1905. From the date of his appointment in 1907 up to 1916 he was continuously engaged in his metallurgical etc. duties.

In 1916 after many months of very strenuous work in drilling men for the A.I.F. both at this University and elsewhere, he went to England to assist in the making of munitions and for the remainder of the war held a responsible position at the great munition works at Gretna as assistant on the nitro-cotton drying area, on the alcohol dehydration plant, and was in complete control of the Solvent Recovery Plant erected and started under his direction.

Frederick Alldis Eastaugh
(From the 1926 Engineering Handbook)

> He received an excellent testimonial from the Superintendent of H.M. Factory at Gretna in May 1919. His experience there during the war impressed upon him the great importance of training a proportion of students in engineering schools at Universities etc. as Chemical Engineers.
>
> On his return to Sydney in June 1919 he set about systematizing this idea and it has subsequently been adopted by the Faculty of Engineering and the Senate of this University, and when funds are available for providing the additional teachers, necessary to the scheme, there is every prospect of this new branch of engineering proving a boon to the community."

Senate records show that they did in fact pass proposals for the installation of Chemical Engineering at Sydney University. However circumstances unknown, probably a shortage of money, deferred such action.

The first graduates in Engineering Technology in 1929 were Humphrey William Turkington and Clifford Whitworth.

Professor Eastaugh retired in 1948, and with him went a whole era and school of thought. What he thought of the new Chemical Engineering Department we do not know. He went back to England to the village of Brent-Eleigh in order to look after his ageing parents who were then in their late nineties. (He was in his late sixties). Some years later he was visited by a few of his former students. He was by then living in a beautiful 16th/17th century thatched cottage, appropriately enough called the Smithy, in the village of Sudbury in Suffolk. He had always had a yearning to retire to the island of Majorca, but somehow he never made it. Instead, he lived peacefully in the English countryside. He made vintage artichoke wine, read only non-fiction and "works <u>not</u> by women authors," and collected what he called "junk" - like old fish knives - from second-hand shops dotted around the countryside. He paid particular attention to any metal bits and pieces that he bought - true to his training to the end.

Twenty-one years later, on July 27th, 1969 and in the twenty-first year of the Sydney University Chemical Engineering Department, Professor Frederick Eastaugh or "Uncle Ted" died in England, aged 87.

<u>ONE STUDENT'S VIEWPOINT OF PROFESSOR EASTAUGH</u>

Professor Eastaugh was a friendly, charming man - a man of the "Old School", who had a philosophical bent. He was also a man of broad wisdom and a wide field of experience, whose teaching policy was to encourage the students to learn how to think. His lecturing reflected this. He tended to talk off the cuff, holding discussions, rather than giving a traditionally didactic lecture. His examination questions also bore his hall mark quite clearly, showing Julius Sumner-Miller type tendencies! One lot of third year students were presented with three, rather surprising questions to answer in their finals.

1. Why is the first cup of tea you pour from a teapot weaker than the last?

2. How can you tell handwrapped sweets from machine wrapped ones?

And the favourite student baffler -

3. Carefully compose a question for this examination and answer it.

The Technology Department - 1937-1940

Geoffrey Venn-Brown, one of the six graduates in 1940, recalls his student days, fifty years ago.

"The period I refer to is, of course, the three or four years just before World War II. Far off, those days seem now, and strangely innocent, or perhaps naive is a more correct description.

It was a tiny department, even for those days, when the whole of Sydney University boasted only around 2000 undergraduate souls, if my memory is correct. There was something of a fuzzy dividing line between the Mining course and Technology, and altogether there was only a tattered handful of troglodytes which retreated from the healthy light of day to wend their tortuous way into and through the smelly and slum-like atmosphere of the narrow and dilapidated passageway beside the old Chemical Department building.

Once inside the gloomy caverns of the department, one became instantly aware that, lurking there somewhere in the shadows was the *deus ex machina*, or the ruling troll - depending on the point of view of the observer. This phenomenon, whatever its true character, was embodied in the person of Professor Eastaugh.

Prof. Eastaugh was the kind of personality which one can't help feeling was way ahead of his time. He would be absolutely ideal, these days, as a stock piece guru for the dispensation of his enormous store of esoteric knowledge and unconventional perspicacity whenever the 7.30 pm Report, 4-Corners or the radio talk-back shows felt it incumbent on them to borrow from an unassailable authority on absolutely everything.

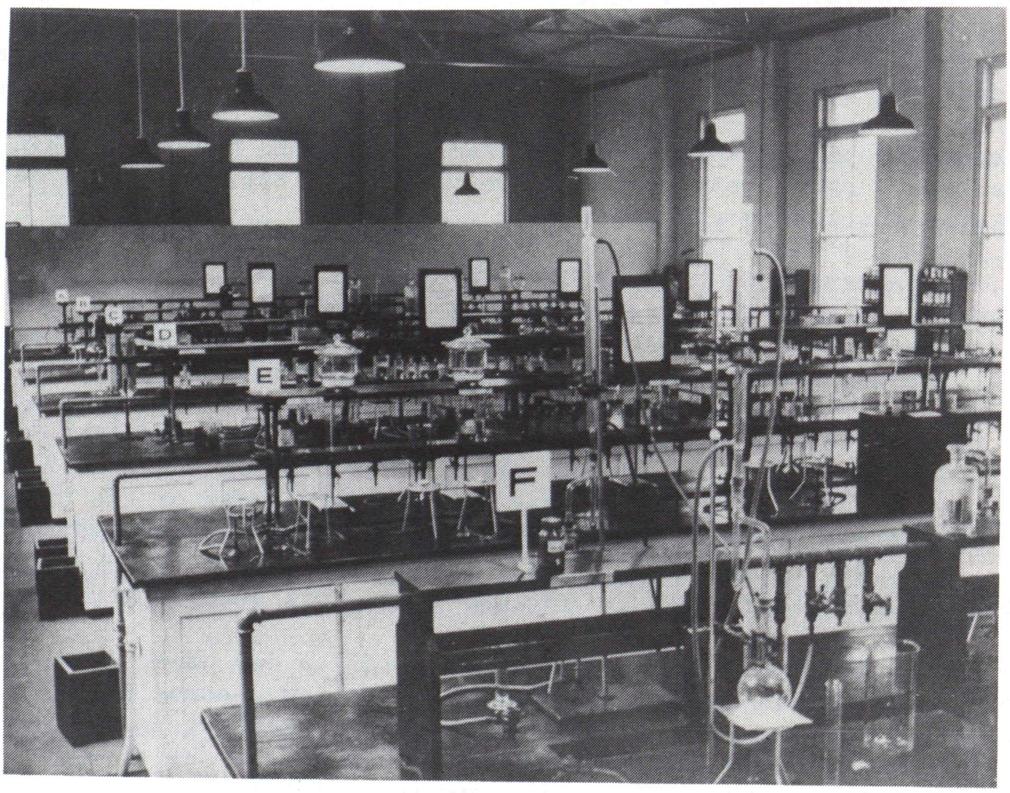
This is how he presented himself to everyone who passed through his hands in the Stygean gloom of the Underworld (which was the Prof.'s very own), and who gladly responded to his universal invitation to all and sundry to give up precious Tuesday nights and attend Wagnerian *soirees* in a darkened laboratory to partake of superb cheddar cheese and vile coffee (the latter heated over a bunsen burner) as a prelude to totally informal but intellectually dynamic free-for-all discussions on any and every subject under the sun held in the Prof.'s own study. (The Prof. was inordinately proud of the quality of his cheese, by the way - and with complete justification. He always selected it himself, and it appeared as a huge, traditional truncated cylinder of tasty delight swaddled in cheesecloth. You can't get this sort of stuff these days.)

I owe a great deal to Professor Eastaugh. Hardly a day passes that I do not consciously remember, or sub-consciously follow, some basic truth about technical matters, and indeed about things other than technical matters. He had quite a lot to offer about life in general. One bit of trivia I recall: he pointed out to the class one day that you would not be able to unwrap a Mintie (at that moment you need it) by pulling the twists at both ends if they were both formed by rotation in the same sense, viewed from the respective ends. They had to be of opposite sense. Hardly a world shattering observation, but what a wonderful guide to offer the mind of a young student as to how to think properly.

I often wonder whether others have carried a similar appreciation of the Prof. with them throughout their lives.

The years I remember also are imprinted with the gentle, quiet but acute personality of Hal Hammond, the lecturer assisting Prof. Eastaugh when I commenced the course, to be followed later by the more intense, but equally likeable Neil Ellis, first a demonstrator and later a lecturer also, like Hal. Many were the times, in my senior years, that I shared a cup or two of execrable Union coffee (or - ugh! - cocoa) with Hal, or Neil, or sometimes even both together, in the Refectory, when we all were constrained to escape from the funereal atmosphere of the dungeons in which we were supposed to be pursuing our various tasks. We would linger as long as decency (and conscience) would allow, before crossing the River Styx back into that dark place beyond the corridors clawed out between the grim walls of the Chemical Dept.

Wonderful days, all. I was greatly privileged to have experienced them."



<u>Laboratory</u> : The Laboratory used by all Engineering Students for Technology I - and later the key area for the first Chemical Engineers.

DEPARTMENT OF ENGINEERING TECHNOLOGY (INCLUDING METALLURGY) - A REPORT FROM THE 1935 YEARBOOK

The work carried out by this Department was, as usual, of a fairly diverse character and may be conveniently divided into five classes -

Chemical Engineering and Applied Physical Chemistry.
Fuels.
Lubricants.
Assaying.
Metallurgy.

These, however, by no means cover all its activities.

The resources of the Department are entirely inadequate even to maintain a comprehensive investigation in one field alone, and most of the work mentioned has been carried out at the request and with the co-operation of industrial undertakings.

(a) Chemical Engineering and Applied Physical Chemistry.

This year the work on the characteristics of stills has been renewed and considerable fundamental information is being collected; at the same time, it is directly applicable to the design and operation of stills in practice.

Further experimental work has also been done on fermentation.

Several small pieces of equipment have been added to this branch, including a large laboratory vacuum pump and experimental pressure filter.

(b) Fuels.

Apart from the periodical investigation of petrols on the local market, and which has been continued for some years, little experimental work has been performed in this branch.

Unfortunately the fuel laboratory has been disorganised for upwards of twelve months through outside circumstances, and several important lines of investigation have had to be discontinued.

New apparatus has recently been obtained, chiefly for the examination of solid fuels, and includes - Bomb Calorimeter of the latest design, Lessing's Coal Assaying Apparatus, Gray-King Coal Apparatus, and new Gas Analysis equipment.

(c) Lubricants.

The Department now has a fairly comprehensive collection of certified testing apparatus, and a large number of standard tests have been carried out during the past year.

Numerous lubrication problems have been examined and solved for industrial undertakings, and included difficulties with several Diesel engines of different types. An investigation of the characteristics of colloidal graphite was also carried out.

(d) Assaying.

Some of the work mentioned under other branches has involved considerable analytical work. A modified method of the rapid analysis of bearing metals (Babbitt type) has been worked out.

(e) Metallurgy.

Considerable investigation work - both on the fundamental and industrial sides - has been done during the past twelve months.

The microstructure and Brinell hardness of a series of Copper-Nickel alloys with additions of up to 1.5 per cent of aluminium, have been studied in connection with the response of these alloys to heat treatment.

A parallel piece of work has been done with a series of 80:20 type brasses, part of the zinc being replaced with 1.5 per cent aluminium and varying amounts of nickel. This work is described in more detail elsewhere in the Year Book.

A comprehensive investigation to the design, construction and failures of brass cooling systems was completed towards the end of last year, and involved considerable work on the deterioration of brass by various corrosive agencies.

Failures of internal combustion engine components have been examined from time to time, and include valves, pistons, piston pins, and bearings; in all cases successful solutions for the troubles have been found.

Thin sheet metals of various kinds have received much attention. At present, an apparently unusual and pernicious type of failure in tin plate is being examined. In this connection the effect of corrosion fatigue on sheet metals is being experimentally investigated.

Other interesting matters studied in connection with the practical uses of metals were bronze bearings of several types, failures of monel metal and stainless steel components, and electrical resistance welding methods. In connection with the latter it may be mentioned that the application of metallagraphic methods helped considerably in devising an improved technique.

Further new apparatus has been added to this branch. Several small electrical heat treatment and melting furnaces have been built with continuous operating temperatures up to 1170°C.

A 30 kg Firth Hardometer was installed towards the end of last year. This machine is capable of measuring hardness in Brinell Numbers over a large range from soft alloys in sheet form up to hardened steels - the latter with a diamond indentor. The indentation is measured with a measuring microscope built into the machine.

At present a Leitz Photomicrographic outfit is being installed, this being the most modern and complete machine for microscopic work in Australia. Photographic magnifications range from 8x to about 4000x and are obtained without alteration of any of the components on the optical bench. Special illumination devices make it possible to obtain excellent photomicrographs of structures which present considerable difficulty with other equipment.

In the near future it is hoped to add a large range potentiometer to the pryometric equipment - this will not only be useful for thermal work but will also be of considerable value in the elucidation of corrosion problems and for applied physico-chemical work.

FOR "THE BETTER PEOPLE"* ONLY

Some notes extracted from old Engineering Yearbooks (1926 and 1931) on particular lectures we experienced.

Ass. Prof. G.F. Sutherland, A.R.C.S.

From "Geordie" we may learn much about Mechanical Engineering Design. His lectures are not hard to attend, being instructive for those who wish to learn and amusing for those who wish to be entertained. Nothing can disturb "Geordie's" tranquility and placidity, and we believe that he would continue to expound calmly in what sounds like Scotch, if only one man were left in the class. He is popularly supposed to hail from the land of the Heather; and we find him a man of unlimited generosity, forbearance and forethought. During lectures his gaze wanders slowly from his innumerable drawings to the feet of the students in the class - maybe he is seeking inspiration there, or attempting to find out who is responsible for all the shuffling. It is evident that the Faculty is not the only one that holds "Geordie" in high regard; but rather does the whole University appreciate his interest in the welfare of the students; is he not the Senate representative on the Union Board, and has he not more than once been its President? Undoubtedly he is one of the most popular of our staff.

Mr. W.H.H. Gibson, B.Sc., M.E., A.M.I. Mech E., A.M.I.E.A.

"Hoot", as he is generally known, is, to put it mildly, every inch a man. His great responsibility is to instruct us in, and to see that we learn, all the intricacies of every type of engine. He has never been known to speak harshly, or to order attention or quietness in his classes; yet everyone pays him the greatest heed, and even the most boisterous feel that it would be out of place to become noisy or riotous. Always willing to help and offer advice, the undergrad feels no disinclination to seek him out and consult him at any time. Though rather retiring and modest, he is one of the most admired and popular instructors in the School.

At present Mr. Gibson is carrying out research work in Mechanical Engineering, and we feel that his efforts will be successful and that the vast amount of engineering knowledge will be increased by them.

He graduated in the Faculty of Science in 1913, took his B.E. degree in 1915 and, after a period as a demonstrator and research scholar in the School, he was awarded the Walter and Eliza Hall Travelling Fellowship in Engineering in 1917. This Fellowship took him to England where he participated in research and development activities with the Admiralty on combustion engines. Returning to Australia, he was apppointed to the staff of the Department of Mechanical Engineering in 1921. During this career in the School he has been very active in research and teaching, so much so that he gained his M.E. degree in 1930 and became known as a research man far beyond the confines of the University of Sydney.

(Ed. Retired 1957, President of Institution of Engineers, 1953)

(*For reasons unknown, the Technologists used to refer to themselves as "The Better People".)

Mr. K.R.M. Hart, B.Sc., B.E.

A past master in the art of designing things which pop out on springs, or some type of link motion, "Keithy" is beginning - so Dame Rumour hath it - to apply this art to the fixtures of the School. We will shortly be able to press a button in the lecture room, and everything will fold up out of sight - including the lecturer! Mr. Hart has also proved himself a competent photographer, being entrusted with the School's camera and film laboratory.

We will always remember him as a man who can appreciate a joke. Any lecturer who received roll-sheets - illuminated (as his were) by us when in Second Year - without a murmur but (rather with a smile), is worthy of the title "Good Sport". We have found Keith always the same - quiet, humourous to a degree and ever ready to help us over our difficulties.

Professor W.A. Miller, B.Sc., M.E., M.I.C.E.

W.A. Miller - "Willie!" - it is a name for members of the P.N.R. School of Engineering to conjecture with. It commands so much respect and so much genuine admiration; it demands so much stark honesty and earnestness; it represents so much that *is* the School.

"Willie"! - a genius for extracting gold from the useless sludge that so often muddles learning - an example of theory and practice as rarely blended - a man with an infinite capacity for hard work and for taking pains - a man who can swallow the bitter boluses of disappointment which he must so often get from us frailer students with a smile and a more ambitious plan for next time - a man whose outward mash of tranquility and extraordinary shyness must cloak an inward fire of enthusiasm and energy - quiet, extraordinarily efficient, reserved to a degree and yet lovable "Willie" is somewhat of an enigma to us all. We know so much and yet so little about him that we find it most difficult to write anything at all. If we were to attempt to describe all that he has done, and is doing, for the School - improvements in the curriculum, in the courses and systems of examinations, etc. - we would be writing for ever as well as we fear incurring his displeasure, for he is the most extraordinarily modest of men. It will suffice then to state that his assistance and kindnesses have left an indelible impression on our minds.

After graduating B.Sc. from Glasgow in 1913, he was first appointed as lecturer the following year. In 1921, he took his M.E. at Sydney with first class honours and the University Medal, and in 1923 was appointed Assistant Professor. He was offered the chair of Civil Engineering in 1926, and during the subsequent years, his keen mind and warm humanity have won him the respect and admiration of the many hundreds of his students.

(Ed. Retired in 1950 after 25 years' service.)

Mr. E.F. Campbell, B.E.

The credit for whatever knowledge we possess of the testing and running of electrical machines must be placed at the door of Mr. Campbell. Quiet and efficient, we found him an excellent imparter of knowledge, and the coolness he displays when inspired students are placing 240V circuits on 415V mains and generally endeavouring to alter the architectural features of the School, marks him as an ideal man for a difficult post. Outside the School we have reason to believe that he explores many of the more intellectual channels of life, and we have our suspicious that his calm, serene glow cloaks a very wide and a very deep mind.

H.J. (Jimmy) Vogan

Mr. Vogan graduated in 1916 with Class 1 Honours and the University Medal. During his final year and also in 1916 and 1917 he assisted with demonstrating and materials testing under Professor Warren. In 1918 he was awarded the Walter and Eliza Hall Fellowship and proceeded to England. Here he first engaged in war work with the Australian Munitions and War Workers' Unit under Sir Henry Barraclough; then he was employed as Assistant Engineer with the Port of London Authority for two years and returned in 1922 to spend one year at the University under the terms of the Fellowship. During 1923 Mr. Vogan was engaged as Assistant Engineer on the staff of the Chief Electrical Engineer, N.S.W. Government Railways.

In 1924 Mr. Vogan was appointed Lecturer and Demonstrator in Civil Engineering, later became Senior Lecturer and since 1947 has been Reader. During this period of thirty-five years he has influenced through his teaching not only students of the senior years of civil engineering but those of all engineering departments who were privileged to attend his second-year courses in Materials and Structures. He has doubtless imparted to many of them something of his own high standards of professional responsibility and meticulous care.

(Retired in 1959)

THE TECHNOLOGY CLASS OF 1947

Peter Denton, Gordon Cozens, Workshop Attendant, Dan Hanrahan, Errol Davis, Jim Fogarty, David Coffey, Ken Coles, John Crane.

(Photograph received from J. Fogarty.)

OIL FROM COAL (A Viewpoint of 1933 - Ed.)

By Assoc. Prof. F.A. Eastaugh, A.R.S.M., F.I.C.

[From Engineering Handbook 1933]

The proved value and extensive use of mineral oil as a source of power has caused those countries which produce coal but have no supplies of mineral oil to look to the former as a source of substitutes for the latter. As Australia has coal of excellent quality but no known source of mineral oil, it is desirable that a few of the facts concerning the conversion of coal into liquid fuel should be considered.

In the first place, it must be realized that coal contains no oil, but is composed for the most part of the same two elements as mineral oil, namely, carbon and hydrogen. Secondly, though carbon and hydrogen are the predominating elements in both coal and oil, there is an important difference in their ratios, being sixteen to one in the coals most suitable for treatment for the production of oil and eight to one in the oil most in demand, namely, petrol or motor spirit. From the second statement it follows that if oil is to be made from coal the carbon:hydrogen ratio must be altered, and obviously this can be done either by removing carbon or adding hydrogen.

The removal of carbon has been practised for many years, though not with the primary object of producing a liquid, which in the past has been regarded as a valuable or troublesome byproduct depending on the circumstances. There are two well known variants of this process, both involving the destructive distillation of the coal.

1. The manufacture of coal or town gas with coke and tar as by-product.
2. The manufacture of metallurgical coke with gas and tar as by-product.

Under modern conditions it would be quite impossible to supply more than a small fraction of the required liquid fuel by either of these processes, for there would be no demand for the gas and coke.

The first deliberate step towards the production of liquid fuel from coal was taken owing to an appreciation that the primary tar which is first formed is further decomposed or cracked owing to exposure to a higher temperature during its passage out of the coking vessel or retort, being thereby decreased in quantity and increased in gravity. Low temperature carbonization, as the new process is called, aims at obtaining more and better tar from coal by coking or carbonizing in such a manner and at such a temperature that the tar is drawn away as soon as formed and not subjected to decomposition or cracking. In addition to the tar a special variety of coke is produced which is free burning and smokeless, and the commercial success of low temperature carbonization depends entirely on a profitable market being found for this coke.

Low temperature tar may be used as a fuel without further treatment, and the British and German navies are using it. A serious objection to the use of this tar is that it will not form a suitable mixture with mineral fuel oil. Distillation of the primary tar yield various fractions, the lightest and most valuable being benzol, which can be used as a substitute for petrol, but a heavier fraction, known as creosote oil, may be used in internal combustion engines after they have been suitably modified, and motor buses in Belfast have been using it for some time, and extensive experiments are being conducted by the London General Omnibus Company. The removal of lighter fractions, however, leaves a pitch which is of little value.

So much for the removal of carbon. Now for the addition of hydrogen. This process, known as hydrogenation, is largely associated with the name of Bergius, the German inventor, and consists in heating the powdered coal in the presence of hydrogen under a high pressure. The result is an almost complete lique- faction of the coal. Much work has been done on these lines and a huge sum of money spent, but though the process has been proved to be a technical success, its financial success is doubtful when competing against mineral oil at its present price.

A report from the British Fuel Research Board states that the quantity of liquid fuel produced by hydrogenation is quite satisfactory, but that its quality leaves much to be desired and promises better results from the hydrogenation of low temperature tar.

In conclusion. Those who talk glibly of the production of oil from coal must consider:

1. By carbonization a yield of liquid fuel can be obtained, but a market must be found for the coke and gas produced at the same time.
2. Hydrogenation will yield liquid fuel in large quantities from coal, but the plant and process are expensive, and the product must compete, not with petrol at retail prices, but with liquid fuels of a much lower value.

SOME THOUGHTS OF PROF. EASTAUGH

If TV had been the "in" thing in 1926, it may have greatly influenced Engineering Technology. The Prof. may have left the School to work with Douglas Fairbanks, as the Science Show would have attracted the fairer sex to the Department in droves. The photograph of the Prof. in the 1926 SUEUA yearbook shows a very handsome young lecturer who certainly would not have been allowed to "hide his light under a bushell".

Some people considered that Technology was static, lacking the forward vision of science. In 1933 Prof. Eastaugh published a short article in the SUEUA yearbook on making oil from coal. It was not a deep technical treatise, but an effort at directing thought and research, and about 40 years before the energy crisis first became a matter of public concern.

Many students have had money problems, particularly in earlier days when government assistance was minimal. One such student before the war received a financial helping hand from Uncle Ted. The Prof.'s only son had died from pneumonia. He sold his son's books and gave the proceeds to his pupil.

I do not think for one moment that this is an isolated case; it merely serves to remind us that the somewhat gruff gentleman of later years was a man with a heart.

RBT (1949)

KEITH BOTTOMLEY (1949) CONSIDERS HIS MEMORIES OF PROFESSOR EASTAUGH

"Of the Hunter/Eastaugh interface I remember it more as a victim (though, in fact,I suffered little) than as a strong supporter of either of them.

I left the Department on good terms with Hunter and he was very helpful to me.

I was on firmer ground however with Eastaugh's values, remember his eccentricities with relish and through them respect for the teaching I had from him.

The key teachings were:-

- to be ready to market my skills in a world (then) not quite ready to seek out too many Australian chemical engineers

- to think "laterally" (as it is now called) as an engineer.

- to be less concerned about examination success and more so with learning by enthusiastic enquiry and critical observation. (Geordie Sutherland - another eccentric of those times - reinforced this latter principle and also the idea that in design work intuition is as important as precise calculation - "no matter what your slide rule says, it has to look right")

These values on principles have wider relevance of course than to the engineering profession. I remember asking Eastaugh if he would approve my three months practical experience at the Shell Clyde Refinery. He said it was of little real consequence where I went. I would either learn what to do or what not to do.

The second anecdote is apocryphal no doubt, that when marking papers he would sit in bed and first weigh them in his hand. Those too light failed. Those too heavy passed. Those just right he read to see if they merited a credit or distinction. "

A.W. SNEDDON (1933) RECOLLECTS HOW PROFESSOR EASTAUGH CONDUCTED A CLASS OF TWO STUDENTS

"Regarding Uncle Ted's running of a small class of two, in 1932, my recollections are that there were no problems at all, and he involved us as much as possible in discussions, also a good deal of lab. work. He encouraged us to pursue our main interests. He certainly had our respect, and a good deal of affection. At that time he was keen on golf, and could be seen regularly practising in the small courtyard outside the lab. during lunch-time, with a line of corks set up on a large door mat, and his trusty wood."

THE FATE OF AN ENGINEER

It came to pass that three men, a lawyer, a doctor and an engineer appeared before St. Peter as he stood guarding the Pearly Gates. The first man to step forward was the lawyer. With confidence and assurance he proceeded to deliver an eloquent address which left St. Peter dazed and bewildered. Before the venerable Saint could recover, the lawyer quickly handed him a writ of mandamus, pushed him aside, and strode through the portals.

Next came the doctor. With an impressive, dignified bearing he introduced himself by saying "I am Dr. Brown". St. Peter received him cordialy, "I feel I know you, Dr. Brown. Many who preceded you said that you had sent them here. Welcome to our city".

The engineer, modest and diffident, had been standing in the background - as engineers do. He now stepped forward. "I am looking for a job", he said. (Engineers do not feel justified in existing unless they have a job). St. Peter wearily shook his head, "I am sorry", he replied, "we have no work here for you. If you want a job you can go to Hell." This response sounded familiar to the engineer and made him feel at home. "Very well", he said, "I have had hell all my life and I expect I can stand it better than the others". St. Peter was puzzled.

"Look here, young man, what are you?" "I am an engineer", was the reply. "Oh yes", said St. Peter, "do you belong to the Engine Drivers' Union?" "No, I am sorry", the engineer responded apologetically, "I am a different kind of engineer". "I do not understand", said St. Peter, "what on earth do you do?" The engineer recalled a definition and calmly replied: "I apply mathematical principles to the control of natural forces".

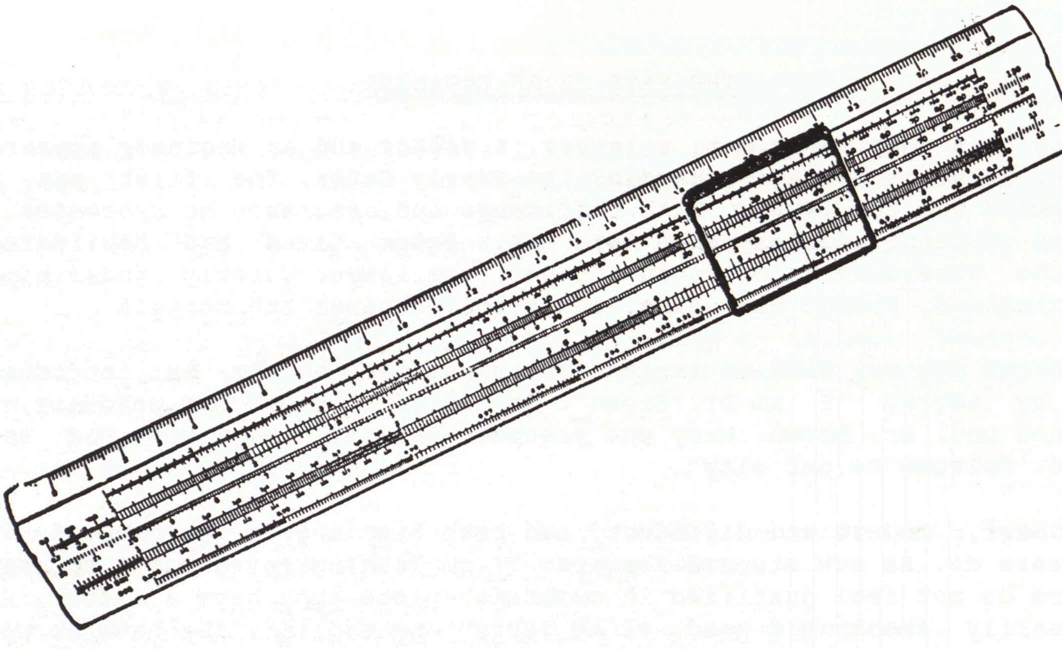
This sounded meaningless to St. Peter, and his temper got the better of him. "Young man", he said, "you can go to Hell with your mathematical principles and try your hand at some of the natural forces there!"

"That suits me", declared the engineer, "I am always glad to go where there is a tough job to tackle". Whereupon he departed to the Nether Regions.

And it came to pass that strange reports began to reach St. Peter. The Celestial denizens who had amused themselves in the past by looking down on less fortunate creatures in the Inferno, commenced asking for transfers to that domain. The sounds of agony and suffering were stilled. Many new arrivals, after seeing both places, selected the Nether Region for their permanent abode. Puzzled, St. Peter sent messengers to visit Hell and report back to him. They returned, all excited, and reported to St. Peter: "That engineer you sent down there has completely reformed the place so that you would not know it now. He has harnessed the Fiery Furnaces for light and power. He has drained the Lakes of Brimestone and has filled the air with cool, perfumed breezes. He has flung bridges across the Bottomless Abyss and has bored tunnels through the Obsidian Cliffs. He has created paved streets, gardens, parks and playgrounds, lakes, rivers and waterfalls. That engineer you sent down there has gone through Hell and made it a realm of happiness, peace and industry".

And St. Peter was so impressed with all he heard that he immediately increased the salary of the engineer from £1/11/6 per week to £1/11/9½. Whereupon the engineer verily imagined himself to be in Heaven.

(Engineering Handbook 1945)



TO-DAY'S QUESTION: "GRANDFATHER, WHAT IS THAT?"

A Technologist's Recollection

In first year design Geordie Sutherland was showing us how to calculate the size of a bearing. The figures of stress, area, load, etc were eventually cancelled down to give the fraction $\frac{4}{2}$. Geordie then produced his large demonstration slide rule (about 5 feet long in those days). He slid the cursor to 4, the divisor to 2, checked his glasses to ensure that he could see accurately, and then wrote $\frac{4}{2} = 1.98$.

He then paused for about 10 seconds while we meditated and muttered about this apparent error and then with a flourish added = 2.00 (say).

Class reaction - roars of applause and stamping of feet. It was our first lesson in practical engineering.

DBW, 1949

"1949-1980 HOW THINGS HAVE CHANGED DURING MY YEARS OF PROFESSIONAL ENGINEERING"

By Max Nesbitt (1949)

"I recall using three feet spiral slide rules when extreme accuracy was required. A quantum jump occurred when facit calculators became available.

During the late 50's my major task was recalibration of the gunsight on the Sabre aircraft. The equations to be solved to find exactly where a bullet went required solutions of partial differentials by successive approximation. It took two of us full time a month to find one solution. Then came the IBM 650, an enormous valve machine, but it solved the problem in ten minutes.

Now it could be done on a reasonable home computer in seconds.

My complaint with the profession lies with the lack of enterprise in Australian industry to pick up an advanced development and run with it. Too often the ideas developed here are matured overseas.

From memory CSIRO was supposed to fill the role of translating basic research into industrial development. I believe they have lapsed into the basic research world leaving a total gap of an organisation devoted to development from basic research.

With regard to Prof. Eastaugh, upon reflection I am not sure that he sought to teach us much but rather to encourage us to think. I remember him with reverence. In anecdote I remember that the melting point of copper is 1083°C. On the basis that at the beginning of a lecture he announced that William the Conqueror invaded England in 1066, therefore, copper melts at 1083°C. He didn't get an honorary doctorate of Oxometry for nothing.

The change to Prof. Hunter was comfortable and clearly a move to a more professional approach to education but when one looks at the achievements of Uncle Ted's graduates, one wonders whether it made any difference."

ON STUDYING ENGINEERING (A 1939 Viewpoint - Ed.)

By B.V. Hamon

Most of those who hope to make their fortunes from the pursuit of engineering are liable to disappointment. The average engineer is poorly rewarded for the four or five years he spends training himself for his profession, and we are led to query the value of that training.

The bare academic course is of limited value - it is not in itself sufficient to to develop all those qualities which must be possessed by the competent engineer. The failure of students and employers to realise this fact is the cause of much of the present dissatisfaction.

From the lectures and practical work provided, we may expect to obtain a sound training in the fundamental principles of whichever branch of engineering science we choose. We learn how to go about the solution of problems, and where and how to look for technical information on specialised subjects. These matters are of major importance, and it is no exaggeration to say that they cannot be obtained satisfactorily outside a University course. But more is required than mere academic training can give, and these extras are too frequently neglected or completely overlooked in our haste to pass examinations.

The ability to speak and write correct English is almost as important as knowledge and ideas about which to speak or write. The low literary standard of most technical articles, together with the poor delivery and grammar of the average engineer when obliged to speak or lecture, make it apparent that some training is needed in these directions.

Committees in general are too often ridiculed and their importance overlooked. We should welcome the opportunities provided by the various University Clubs and Societies for gaining some knowledge of the functioning of committees.

One of the loudest complaints of employers of University graduates is that they (the graduates) are impractical and lack what might be termed "business sense". Except during the six months' practical work, we have very little contact with industry, and find it difficult to appreciate the organisation and economic background of modern business. For this reason, it appears unfair that employers should expect satisfactory results from graduates in the first few months of their employment. Time must be allowed in which a transition of outlook from the academic to the more practical can take place; and graduates must be allowed some months in which to equip themselves with the specialised knowledge demanded in the majority of positions in modern industry.

Much is to be gained from meeting and talking with practising engineers, especially those engaged in the branch of engineering in which one is particularly interested. It is mainly for this reason that attendance at Institution of Engineers' meetings may be considered beneficial. It may be true that many of the papers delivered at such meetings are not of interest to all members, and that they may be read in the Journal of the Institution without the necessity of being heard. This line of argument, however, overlooks the immense benefit to be derived from the formal discussion of the paper at its conclusion, and the informal chats with senior professional men before and after the meeting. The Institution provides us with the opportunity of becoming acquainted with practising engineers and with students at the Technical College, and we have ourselves to blame if we do not take full advantage of that opportunity.

Finally, we should make an effort to steal a little culture before we leave such a seat of learning. To have spent four or five years in acquiring no more than the ability to solve engineering problems is to have let slip a great opportunity. One may almost as well obtain one's training at the Technical College. Besides making a living, one has also to "live"; and to do that with the maximum enjoyment for oneself and benefit to the community requires a more liberal education than is set down in the faculty curriculum.

(Engineering Handbook 1939)

OXOMETRICAL STATUS REPORT - 1988

(For those students of the 1940's versed in Oxometry)

In 1942 a major step forward arrived in our understanding of the Universe. This advancement occurred just 16 years after Einstein published the General Theory of Relativity. As in this case, the immediate result was a surge of learned papers (see references), followed in due course by dazzling practical applications. But whereas nuclear bombs and nuclear power only indirectly effect the general population (sic), Oxoplasm has infused through the whole fabric of society.

Lord Kelvin stated that we have little understanding of anything until we can describe it in numbers. It was natural, therefore, to quantify oxoplasmic phenomena at an early stage, and the maximum theoretical value of the Intrinsic Oxogenic Potential was defined as one OERSTAU. This is a large unit in absolute terms, and a practical unit was introduced, given by 10^6 GHERDLA = 1 OERSTAU. At the time of the early experimental work the background oxoplasmic radiation (flux) at approx 4.2°K was undetected. Experimental measurements at normal (terrestial) temperatures were made in MILLIGHERDLA.

By 1947/48 increased experimental sensitivity had revealed the background radiation. Further, superconductivity had been predicted on theoretical grounds at temperatures approaching ambient. Measured I.O.P. (see above) had become unweildy and the digital quantification was expected to expand further with superconductivity development. At the World Convention of Oxometrical Societies held in Sydney in the latter part of the decade it was resolved to simplify the nomenclature and units of the discipline. To avoid confusion with the earlier and traditional units, the I.O.P. was to be referred to as the BQ, and the practical unit from experimental measurement and observation would be the MILLIOERSTAU. This was further simplified in the English speaking world to MILLIEASTAUGH*.

The B. Quotient (BQ for short) is defined as a simple ratio. It has also been represented by various empirical equations. However, none of these approaches address the fundamental understanding of the phenomena. More advanced studies consider wave motion a more correct interpretation. However, while r.m.s. values are convenient, there are experimental difficulties more easily handled by quantum mechanics. There is a growing need for more fundamental research. Since the development of transistor devices there has been an exponential growth of both generators and receivers, but no corresponding increase in amplitude or frequency modulated dedigitising ability.

A.B. ULLMAN D.Sc.(OXOM)

References: What is your B.Q.?
President, Oxometrical Society 1942 p24

Oxometrical Variations
M.O. 1942 p32

Published in The Engineering Year Book 1942

Oxometrical Society Report Eng. Year Book 1950 p97

*It should be noted when referring to earlier texts that

1 MILLIEASTAUGH = 10^3 GHERDLA
1 MILLIEASTAUGH = 10^6 MILLIGHERDLA

(R.B.T.)

OPERATION SEA LION - 1948

It had always been customary in the days when there was but one University in Sydney, to perform some act of originality (inoffensive and harmless) by the students, in downtown Sydney.

As Director of Social Activities at the P.N.R. School of Engineering in 1948, I thought this custom should be respected. A small group of students with a similar viewpoint was gathered and many ideas were put forward as to what we might do.

There was at that time a ginger bearded dropout style (J.C. type, today) who stood each morning on the corner of Abercrombie Street and Broadway contemplating the world go by. Each morning as we travelled on the tram to the University, we would observe him and wonder what he was thinking about. He would stroke his beard, turn his head this way and that, and contemplate the hustle and bustle. There was nothing ostentatious or provocative about him, he was just there every morning, and in the back of many minds was the thought "why do we get all tizzed up about our routine of getting to lectures?"

So it was - a plan was made. We would dress up three people in similar attire, with similar beards and hair and put them on the other three corners of Broadway and Abercrombie. Thus there would be four observers of humanity, not one as was usual.

However all this was not to be. At much the same time, October 1948, there was a Sea Lion (Walrus type) reported in Sydney Harbour. Sir Edward Hallstrom. who had a very successful business in manufacturing Silent Knight refrigerators, was Chairman of the Taronga Zoo Trust and he offered a reward of £25 for its capture and eventual placement in the Zoo. But despite reports no one could catch the Sea Lion. One moment it was reported in the Harbour, the next minute it was reported in Newcastle. Public interest in the Sea Lion increased and so did ours.

Hazzard, Cleland, Wallace and myself replanned. We would make up our Sea Lion (Wallace), a fisherman would catch him on a rod (DBW), Cleland would carry a notice "Sea Lion caught on a Silent Night" and Hazzard a notice "Here's the Sea Lion, Mr. Hallstrom, where's the £25?"

We would make our way into Martin Place via Bull Chambers and emerge on Martin Place just above the clock next to the public toilets (about adjacent to Westpac nowadays).

Unfortunately there was in our midst an informant. Someone within our ranks decided to take the escape a bit further than we had planned. That someone tipped off the press and the police.

The result was a successful emergence on Martin Place and a short period in our act. Then came the police, a Black Maria and we were bundled off most unceremoniously to Phillip St Police Station. There we were finger printed and then taken in another Black Maria to Liverpool St Police Station. We were put in cells with a collection of derelicts and drunks to cool off.

Eventually, a few hours later, we were put in front of the Magistrate who fined us £2 each for offensive behaviour. Once out in the wide world, we noticed the billboards of the Sun, "Police and Students Clash".

Having paid our £2 fine, we wanted to forget the whole affair. After all there were examinations to get on with. But again, such was not to be. The Students' Representative Council had protest meetings about "freedom" and such. We were never invited to them, nor did we ever attend them. Some people had found "a cause".

Then we had a phone call from an eminent barrister. He would be pleased to conduct an appeal against the conviction free of cost. And this he did. The Judge considered that what we did was not "offensive" in the general sense, although it may have been offensive to the police, and we were freed of our conviction.

Sir Edward contacted us and suggested that if we would bring our Sea Lion to the Zoo and put it in with the seals, he would give us the $25. So this we did. The press was there, the police were there, and all went uneventfully. Sir Edward took us all to lunch, and paid the £25.

From the £25 we deducted our expenses of some £8.50 (a lot of money in those days) and presented the balance to the Spastic Centre.

DBW (1949)

BEER TASTING - FOR TECHNOLOGISTS ONLY?

There is a graduate of 1936 who has insisted that there is nothing in common between Technology as then taught and Chemical Engineering. The proof of the pudding is more in the eating than the talking. This gentleman, I am told, was Chief Taster for the beer that was brewed in the Department under the watchful eye of Uncle Ted!

In 1947 the same Prof. supervised the distillation of an interesting spirit which was produced from the dregs obtained from the casks at the U.P. (the University Pub, just down Broadway from the main gates, for those too young to know!).

RBT (1949)

CHEMICAL ENGINEERING INTRODUCES TRI-IODIDE

In 1948 Prof. Hunter donated a pound of iodine and carefully instructed and supervised the production, storage and use of the stoichiometric equivalent of Nitrogen Tri-iodide (probably enough to demolish the Department). It was carefully placed in small doses around the city during Commem. Week and provided an explosive response when stepped upon.

RBT (1949)