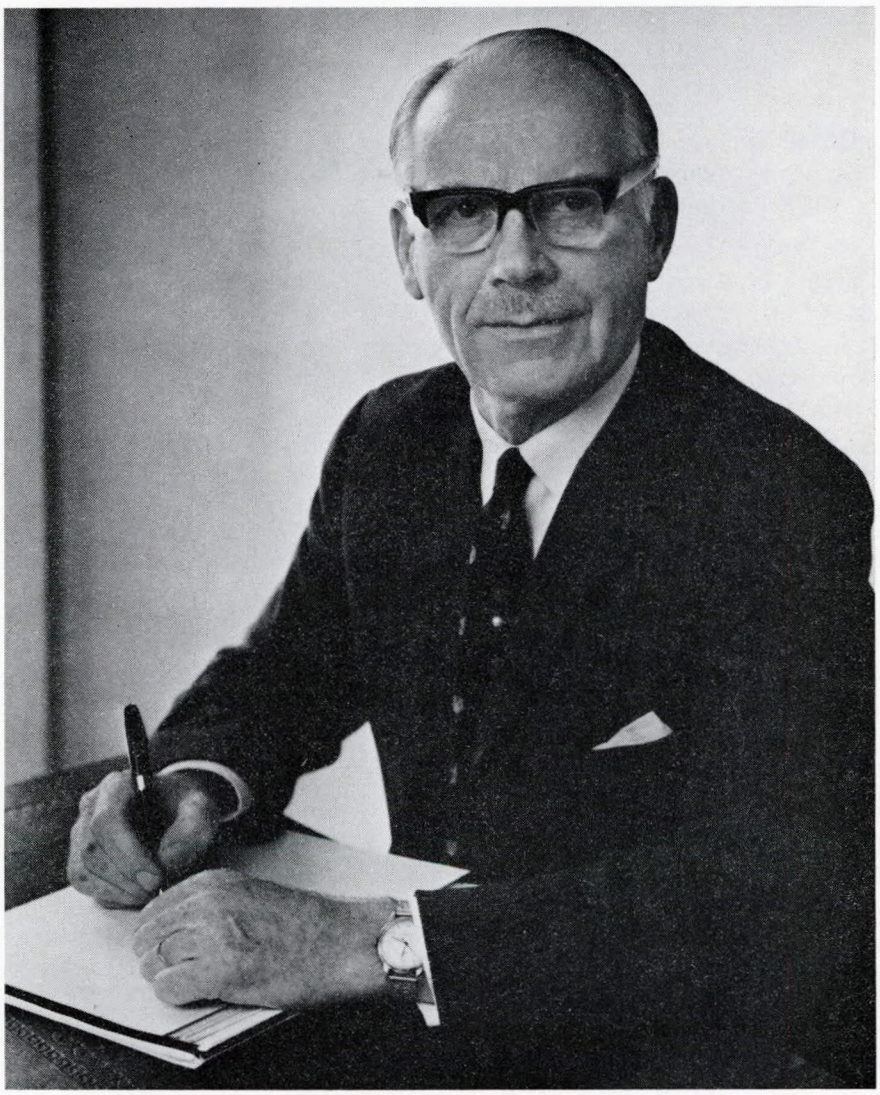

SIMON ARCHER, D.Sc., C.Eng., F.I.Mar.E.

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Dr. S. Archer, C.Eng., F.I.Mar.E., F.R.I.N.A., F.I.Mech.E., M.N.E.C.I.E.S., C.G.I.A., President of the Institute of Marine Engineers, has been a Member since 1947, becoming a Fellow under the new By-Laws this year.

Dr. Archer received his practical training in Norway and on the Tyne. As a graduate of Armstrong College, he joined Lloyd's Register of Shipping in 1936 and in 1942 was appointed to the Research and Technical Investigation staff. In 1952 he headed a Department responsible for the approval of shafting torsional vibration characteristics and at the same time developed a Department for recording and analysing marine machinery defects. From 1957 to 1964 he was Principal Surveyor in charge of the Department approving machinery plans, thereafter being appointed Head of the then newly constituted Research and Technical Advisory Services Department. He retired in September 1972 with the rank of an Assistant Chief Engineer Surveyor.

Dr. Archer has made a distinguished contribution to technical developments in propeller shafting, marine power transmission and vibration theory and was awarded the M.Sc. degree of Durham University in 1950 for his first published paper, "Screwshaft Casualities—the Influence of Torsional Vibration and Propeller Immersion". In 1951 he was awarded a Thomas Lowe Gray Prize by the Institution of Mechanical Engineers for his paper, "Contribution to Improved Accuracy in the Calculation and Measurement of Torsional Vibration Stresses in Marine Propeller Shafting" and gave the 36th Thomas Lowe Gray Lecture in 1964. He has also presented papers to this Institute on vibration, reduction gearing and shafting. He was awarded the D.Sc. degree in 1965 by the University of Newcastle upon Tyne for his published works on marine engineering. In 1972 Dr. Archer gave the Andrew Laing Memorial Lecture to the North East Coast Institution of Engineers and Shipbuilders and in the same year was presented with the City and Guilds of London Institute Insignia Award in Technology *(Honoris Causa)* in recognition of his significant contribution to marine engineering.

Dr. Archer has served on the Papers and Technical Committee of the Institute, being its Chairman for three years, on the Office Bearers Nomination Committee and has been a member of Council since 1964. He was elected a Vice-President in 1967.

PRESIDENTIAL ADDRESS

of

DR. SIMON ARCHER, C.Eng., F.I.Mar.E.

To be elected President of this Institute, which today is the marine technology society with the largest total and overseas membership and a notable international reputation, is a high honour indeed. My first call then is to express my deep appreciation of the opportunity and privilege to serve you in this capacity and to thank all those who, in innumerable ways during my career, have helped me on the road to such a high office.

On hearing the news of my election, my pleasure was somewhat tempered by the warning that this year, for the first time, in consequence of the new By-Laws I was to be a "working" president and would thereby combine the offices of President and Chairman of Council. This is, I believe, in management parlance known as "rationalization". I hasten to dispel any invidious comparison which might thereby be inferred concerning my many distinguished predecessors for whom lack of office as Chairman of Council assuredly in no way inhibited their most valuable work for the Institute. I also hasten to add that, in the event, the new presidential function is less onerous than would at first appear, since at the same time the President is relieved of membership (except *ex officio*) of most of the committees of Council previously chaired, or at least attended as a member, by the former chairmen of Council.

In embarking on my Address, I feel I must touch briefly on certain recent important events, which as from May this year will markedly affect the membership of our Institute. As most members will know, in consequence of the Institute's membership of the Council of Engineering Institutions, the federal association of fifteen professional engineering institutions, it has been necessary to revise our standards of professional qualifications for corporate members of the Institute to bring them into line with those acceptable to H.M. Privy Council as qualifying for registration as chartered engineers. For the same reason the Council has formulated revised and expanded Rules of Professional Conduct.

These and other changes to our By-Laws were prepared last year and submitted for consideration of H.M. Privy Council. Their approval in May this year means that, as from 1 January, 1974, higher academic standards are mandatory for corporate membership, i.e. for Fellows and Members, and, simultaneously, the minimum period of practical training required for such candidates has been reduced. On the other hand, the door to corporate membership will be held open for a period of ten years in the case of mature candidates holding first class D.T.I. Certificates of Competency, or equivalent, subject to passing a special C.E.I. academic test.

The argument to justify a reduced minimum period of practical training, compared with the requirements applicable in the days when the steam reciprocator and Scotch boiler held the field, have been much debated in recent years, but in the main can be summed up as follows:

i) Spares, even very heavy items, can today be flown anywhere in the world at short notice.

ii) Spares are machined to much closer tolerances today, thus largely eliminating the need for initial fitting work on board.

iii) Owing to the great improvements in radio communication chief engineers can more readily obtain advice on machinery problems from head office, wherever a ship may be located in the world.

iv) In view of the much quicker turnround of modern ships, especially tankers and bulk carriers, there is less time in port for the ships' engineers to carry out overhaul work on board, i.e. "less opportunity to enlarge their experience by discovery in overhaul" (to quote the late Mr. James Gray, C.B.E., B.Sc., of the former Union Castle Line). Instead, understandably perhaps, engineers in home ports tend to depart quickly on leave and the repairs are left almost entirely to shore labour with their greater resources of manpower, tools and equipment. Furthermore, repair establishments, even in the remoter ports, are now generally better equipped and more experienced than formerly.

v) With the increasing use of automatic controls and monitoring devices, there is a tendency to extend periods between overhauls, a further factor contributing to reduce the amount of fitting work in service.

Thus, overall, the need for a substantial period of training on "heavy fitting", formerly deemed so essential for the marine engineer, has become less imperative today, when instead greater emphasis on training in such subjects as "control engineering" can be expected to yield bigger dividends.

At this point it may be useful to take stock of where our Institute stands relative to the engineering profession as a whole and C.E.I. in particular. Clearly, the professional societies exist to serve the professions which created them and, for some, this service includes such things as licence to practise, conditions of employment, fixing of charges and other non-learned society interests of their members. In the engineering profession, in this country at least, the major institutions have hitherto almost entirely confined their services to the learned society functions and their qualifying activities have been limited to those necessary for membership which have not constituted a "licence to practise". This qualifying function has only recently been "federalized" in C.E.I. through the Engineers Registration Board for purposes of registering chartered engineers, technician engineers and technicians on a common basis, in each category respectively, of unified standards of qualification and experience. Although this qualifying role covers the fifteen constituent institutions, it is not at this stage a national, i.e. statutory, title as is the case in several other countries, where also in some the title is linked to a licence to practise.

Clearly, in this country there are engineers who, although not members of any of the fifteen C.E.I. institutions, are potentially charterable on the basis of education, training, experience and responsibility. Currently, provision is being sought to be made for some of these engineers of professional quality, who are members of certain "approved" technician engineer institutions, to be able to achieve chartered status through the device of affiliation to C.E.I. of the institution concerned. This, however, would be granted only under very strict conditions and safeguards, and the institution seeking affiliation would be expected either to merge in due course with the constituent member of C.E.I. sponsoring it, or to work towards chartered status in its own right. Nevertheless this still leaves out the potentially charterable engineer who is a member of no professional institution at all. There are those who argue, and perhaps with justice, that such "lone wolf" engineers contribute little to the general body of engineering knowledge and are less likely to be able to keep abreast of the latest developments in their particular branch of engineering. Why then should they be awarded chartered professional status? On the other hand if the C.Eng title is ultimately to be recognized as a national statutory professional qualification, it would be difficult to exclude such engineers, provided the registering body were competent to assess their claim to be so registered and to monitor their professional conduct.

Possibly influenced partly by these problems, suggestions have recently been made that in the future there should ultimately be a single professional engineering institution (e.g. the Royal Institution of Engineers) with sub-divisions representing the various specialist disciplines, or industries, or groups of these.

It is envisaged by some that such an integrated, all-embracing

organization would have delegated to it by Government the national registration function for professional engineers, technician engineers and technicians. The learned society functions would be retained by each constituent institution, who, as now, would also act for the corporate body in a qualifying role for candidates in each of these categories and in a monitoring role for the observance of common codes of conduct. Whether the national title would also carry with it a "licence to practise" authority is debatable, but it is worth noting that this is the case in certain other countries, including some of our partners in the E.E.C.

Some of you may know that within the present membership of C.E.I. there is a loose sub-division into six groups, the members in each group being adjudged to have related interests. One example comprises the Civils, the Structurals and the Municipals with the Naval Architects and ourselves as another. The general policy of C.E.I. is to resist the proliferation of constituent members. In fact, some people believe that C.E.I. should encourage and facilitate their eventual numerical reduction by appropriate mergers.

In our own case we are looking forward to promoting ever closer relations with our sister institution, with whom on major issues we share a unity of interests. This, in my view, (and I am aware that there is a body of similar opinion in both institutions) can only be of ultimate benefit to the British shipping and shipbuilding industries. Experience in other major maritime countries having joint naval architectural and marine engineering societies suggests that in this modern technological world there is less and less justification for a dichotomy between the two major branches of the shipbuilding industry. Some of my distinguished predecessors, including Vice-Admiral Sir George Raper in his Address last year, have expressed thoughts very much akin to these.

In the membership of C.E.I. there are, of course, three main, what one might term, "single-discipline" or fundamental institutions, namely, civil, mechanical and electrical, covering the main sub-divisions of engineering technology, with possibly a fourth in chemical engineering. In this country other institutions have been formed to cater for the interests of particular industries, which in themselves often involve the application of more than one of the fundamental disciplines. Examples are the gas industry, the aeronautical industry, the building services industry (an institution for which is currently under consideration) and, especially perhaps, our own industry of marine technology.

The modern marine engineer, whether chartered or otherwise, has to be familiar with a tremendously wide range of disciplines, quite apart from his fundamental mechanical interests.

Thus, chemical engineering expertise is required for the design and operation of chemical carriers, including gas tankers, in some cases involving sophisticated refrigerating and pumping machinery, heat exchangers etc, demanding special cryogenically suitable materials. In ocean engineering too we have a whole new set of engineering problems, much of it structural or naval architectural in emphasis. Then again there is the enormous growth in the use of electronics on board ship, in particular for automation, control and monitoring purposes, quite apart from navigation and radio. Looking ahead also, there are superconducting electrical and nuclear propulsion systems as examples of possible merchant ship power plants. It would thus appear that still more disciplines may be involved in the future.

All this means that the learned society function of our Institute must inevitably be expanded to cater for such a vastly extended range of interests. This also calls for a stepping up of our international operations, including greater support for the activities and expansion of our overseas divisions and branches, and collaboration with other professional engineering societies, especially in the organization of international conferences and symposia, with or without concurrent maritime exhibitions. For these reasons therefore it is my view that the technical branch of the Institute's staff will require strengthening in the future. A start has already been made in this direction, but before long further expansion may well be desirable.

Recently a discussion arose on the question whether, and if so in what ways, the Institute should concern itself with marine engineering research. Whilst the original aims and objects of the Institute (1888) could hardly be interpreted to include active research, those embodied in our latest Royal Charter do not exclude such research, namely "to promote the scientific development of Marine Engineering in all its branches and in the furtherance of such objects (but not otherwise) . . . to do any such other lawful things as are incidental or conducive to the attainment of any of the above mentioned objects". Looking back through the recorded history of the Institute, I have been unable to find any instance of independent research projects having been carried out by the Institute. There are, however, plenty of examples of the Institute's helping to encourage the formation of research bodies and of being represented on research and design committees, also at machinery and boiler trials. The Institute has, of course, also from time to time recommended that research be conducted to overcome certain prevalent problems encountered in marine machinery installations. A good example was the erosion/corrosion of condenser tubes. Quite apart from cost considerations (extra staff, equipment, possibly even a laboratory) in relation to our resources, there are already in this country other organizations, in addition to the major shipping companies, actively conducting marine engineering research, with or without laboratory facilities, such as British Ship Research Association, United Kingdom Chamber of Commerce, Lloyd's Register of Shipping, British Internal Combustion Engine Manufacturers' Association, Yarrow—Admiralty Research Department (Y-ARD Ltd.) etc. It thus appears that at this juncture the Institute can best serve the interests of marine engineering progress in this direction by recommending the initiation of specific research projects, participating in research committee work and critically reviewing research programmes and the products of research, much as it has done in the past. One would expect this to be channelled through the Council's Technical Committee which would be responsible in addition for formulating, as far as this is ever possible, corporate technical comment or opinion on behalf of the Institute on any specific engineering subject or problem which may be put to it. This could, if necessary, involve the setting up of *ad hoc* sub-committees or panels with powers to co-opt experts in the particular field, whether members or non-members of the Institute.

Before concluding, I feel I must offer just a few thoughts, possibly of more interest to our younger members, concerning the particular branch of marine engineering which has claimed my own endeavours during my professional working life. It is also a branch yielding a substantial membership of this Institute. I refer to the career of a classification society surveyor. I make no apologies for devoting a few minutes to this subject, for ever since the founding of the Institute in 1889, Lloyd's Register, as an organization, has been one of its most ardent supporters, not only on the Council but also in the membership. Both societies are international in orientation, are non-profit-making and aside from the present general economic "freeze", are outside Government control. Apart from being neighbours in the City here, and latterly even closer neighbours, the Institute and Lloyd's Register have shared, especially in recent years, a number of activities such as certain library and abstracting services and in many other ways have collaborated over the years.

A career as a classification surveyor was commended to me by Sir Westcott S. Abell, K.B.E., M.A., my professor of naval architecture at Durham University, who had previously been Chief Ship Surveyor at Lloyd's Register, and, as it turned out, I owe him a great deal for that advice, since it opened to me a profession of absorbing technical and human interest with one of the largest single employers of marine engineers in the world.

A marine engineer, whether university trained or holding D.T.I. Certificates of Competency, is not normally considered for a surveyorship until he has put in a reasonable period of workshop training and sea time. Thus, engineer surveyors usually enter service at about age 26 or above, by which time they are assumed to know roughly what marine engineering is all about!

I think I can claim a fair knowledge of the conditions of service at the Register and the following remarks are offered for the information of anyone not so familiar. They are in no way

intended to draw invidious comparison with other branches of marine engineering.

As in any profession, there are of course pro's and con's for devoting one's working life to a classification society.

Taking the "con's" first, there is no doubt that creativity is limited compared with an engineering design office in a shipping company or an industrial firm, being mostly advisory in nature and without direct financial responsibility. Also the surveyor's function, being by its very nature to seek out and correct faults in materials, design or manufacture and deviations from rule requirements, must inevitably partake somewhat of a "policing" activity. It can nevertheless be constructive and positive by the exercise of good engineering design sense and imagination, whether as red ink on a blueprint or, equally perhaps, in discussion with builders' or owners' representatives, or again by the application of research or special investigation. It also requires sound judgement, for example in the assessment of the degree of equivalence of a proposed departure from a strict rule requirement.

On the credit side also there is an assured status for a classification surveyor, provided he demonstrates utter integrity, and shows in word and action that such respect is merited and not generated merely by a background of long tradition and the reputation of his particular society.

Another bonus is the absence of direct commercial pressure such as prevails in shipbuilding and shipowning, there being no shareholders or dividends to worry about! Probably the only real commercial pressure is the need and duty to reduce to a minimum any possible delays to a ship which may result from classification requirements.

A classification surveyor has many opportunities for improving his technical knowledge and inspection skills and of keeping abreast of the latest advances in engineering. Here, of course, this Institute plays an important part. If the surveyor is lucky enough to be stationed at headquarters, it is only a couple of minutes to the (usually) quiet haven of the Institute library, or to hearing and discussing a technical paper in the lecture hall.

There are, of course, also opportunities for a surveyor to see the world, whether by overseas service at an outport office or otherwise. This, incidently, means that almost anywhere he goes in the world he can count on friendly help from a colleague.

There is also plenty of variety in the surveyor's job content and the chance to become familiar with a wide range of marine machinery designs and production practices. Some surveyors with inventive bents have made important contributions to marine engineering design, probably sparked off in some cases by investigation work.

For the man with a leaning towards research, the activites in this field range widely, from fundamental or general research to post mortem investigation of failed machinery components or the establishment of the cause, or causes, of recurring or epidemic type failures.

Examples of the first type include research into fatigue and other properties of materials, such as resistance to shock and other loadings at low temperatures, creep at elevated temperatures, corrosion resistance etc, etc.

The bulk of the classification society's work in this area, however, can be classed as *ad hoc* or applied research into specific problems. Here the surveyor can call upon the help of a well-equipped laboratory, ready access to the vast storehouse of operational experience represented by the survey reports on many thousands of ships of all types, sizes and trades and, for his theoretical work, the services of powerful modern computers.

In the course of my service with Lloyd's Register, I was fortunate in being associated with much of the engineering research work and the *ad hoc* investigation of operating troubles. Casting my mind back, one or two occasions stand out as perhaps worthy of mention here as indicative of the wide range of problems a classification surveyor may have to deal with.

During the last war at the height of the U-boat ravages in the North Atlantic, the Government became concerned over the increasing losses of certain types of cargo tramp. The type known as "Canadians" had twin four-furnace Scotch boilers, some of them coal-fired. The somewhat similar "Ocean" type had triple, three-furnace Scotch boilers, also coal-fired. The problem was that, although the main engines of these two types were almost identical, the "Canadians" were much slower and it was therefore necessary to decide whether they should be relegated to a slower convoy, thus permitting a higher speed for the faster convoy without so much straggling. Accordingly, comparative speed trials as between an "Ocean" and a "Canadian" vessel were conducted on the Arran measured mile in collaboration with the Ministry surveyors. I remember we had not only to operate stop watches on the bridge, but also to take indicator cards, check expansion link settings and coal consumption, and also watch firing operations in the stokehold. The trials were run with and without torpedo nets rigged. These had a noticeable effect on speed. As I remember it, one of the factors was the greater difficulty of hand-firing the high wing furnaces of the four-furnace boilers on the "Canadian" vessels and, I believe, as a result of the trials, they were thereafter assigned to the slower convoys.

Another and better known problem was the epidemic of screwshaft casualties on the "Liberty" type ships, of which nearly 600 had to be renewed in a fleet of some 2500, including 100 propeller losses at sea in the three years, 1945-1948. Here as a result of intensive trials and measurements at sea, including a simulated racing trial in port and assessment of statistical data on the circumstances of each casualty, the causes were, beyond reasonable doubt, found to be torsional vibration critical speeds during racing under inadequately ballasted conditions.

A further memorable problem arose from the poor quality of some of the gear hobbing machines in this country, probably a result of neglected maintenance during the war emergency period. One particularly bad example in 1949 affected a certain twin-screw turbine-driven cargo/passenger vessel, in which despite the application of hand-dressing and other remedial measures, it was found impossible to prevent scuffing and overheating of the teeth of all four primary pinions, even after repeated trials and several months' delay to the ship. It was only after measurements had revealed the presence of severe undulations on the all-addendum teeth, originating from a gross cyclic error in the "creep" type hobber on which the pinions had been cut and after recutting and shaving on another machine, that the gears were ultimately made to run. During one of the earlier trials conducted at night in relatively confined waters whilst attempting to achieve full service revolutions without scuffing, we were thrown off our feet when, with the briefest of warnings, comprising repeated rings for "Full Astern" on both engines, the ship ran ashore at 17 knots! The pilot had been given strict instructions to do his utmost to maintain steady revolutions to assist the engineers in their crucial efforts to avoid scuffing the gears and, unfortunately, in doing so and taking evasive action to miss another ship, had miscalculated and in the dark realized too late that at that speed he could not possibly clear a certain headland. With great presence of mind he decided there was only one thing for it and elected to beach the ship on the only soft area of shore within miles! I well remember, on "surfacing" from the engine room, being horrified to see great fangs of rocks within 50 yards of the ship port and starboard! The amazing thing was that apart from a few bottom rivets there was no significant structural damage to the hull! The propellers, however, had to be renewed as they were badly eroded by the shingle in going ahead and astern when attempting to free the ship.

Taken all round then, a young classification society surveyor can today look forward to a job full of absorbing interest with good career prospects and, given what it takes, and perhaps just that little extra bit of luck, there is no knowing how far he may go. Again, the fact that he can claim to have received the accolade of "chartered marine engineer" through this Institute must surely be a vital contribution to his professional progress!

In conclusion, I feel highly privileged to hold office at a time when our Institute, which has done so much for the marine engineer in the past and has, I am confident, so much of great potential to offer in the future, enters officially upon a new phase in its history, wherein the status of British marine engineers will not only be enhanced, but also receives due recognition of its full professional standing in the engineering world.