

Some Aspects of the Application of Planned Maintenance to Marine Engineering*

W. H. FALCONER (Associate Member)

AUTHOR'S REPLY

Mr. McClimont's sentiments concerning the reliability of modern designs were shared by the author; in many instances failures were due to neglect. Planned maintenance set out to reduce such incidents to negligible proportions. It was extremely difficult, if not impossible, to produce a schedule which would be applicable to all types of vessels. The type of service, the staff available and policy of each company had an important bearing on the type of schedule to be used. The author was very conscious of the fact that figures could be used to prove anything. He does not think anyone would disagree with the statement that it was the duty of every engineer to present the facts and to weigh evidence impartially. Unfortunately, the enthusiast was occasionally blinded by his own enthusiasm.

The author felt that he had confused Mr. McClimont concerning the compilation of record sheets. He was aware that in the first instance the engine builder's record sheet might be of a perfunctory nature. If the machinery manufacturer's relationship with his customers were as it should be, he would be in a very much better position to compile a comprehensive record sheet. Both would benefit from the exchange of information and defects would be rectified before failure occurred.

Commander Meadows and other contributors to the discussion had drawn attention to the fact that planned maintenance could and had been applied to all aspects of fleet maintenance. While this would be a very desirable state of affairs, the author was of the opinion that the greatest single benefit was obtained when it was effectively applied to all the engine room machinery.

Replying to Mr. McAfee, the author would like to point out that cylinder liners were only used as an example, and that techniques applied to them could be applied to most other components. If all items were examined regularly, as was implied, the incidence of breakdown would be reduced. Crack detectors were in regular use in the author's company. Piston rods, for example, were crack detected annually or when they were changed, which ever was the shorter interval. The discovery of the crack illustrated initiated regular testing of that type of piston. Unfortunately, the geometric shape of the component under examination severely limited the general use of an ultrasonic crack detector, with the result that techniques had to be developed to deal with the different and irregular shaped components which one found in engineering.

Main engine crankcase bolts, studs, chains and other fastenings were tested and inspected by the engine room staff twice per voyage. There was no standard form covering this procedure in general use yet, but the information was recorded

on the list of work executed during the voyage. The failure of an auxiliary engine bottom end bolt was an extremely rare occurrence. This type of machinery was examined and the bolts were tested every thousand hours.

The author would like to point out that he attributed the absence of any real trouble in this direction to the fact that it had always been his company's policy to use 28-32 ton tensile steel for all piston rods, bolts, studs, etc., which were subject to cyclic loading. Periodic examinations were linked with the survey requirements. These did not assist or hinder planning to any marked degree as the interval between surveys was large enough to be accommodated in most maintenance plans. The requirements were certainly not too exacting. In many instances the interval could, with advantage, be extended and in others reduced.

The author was of the opinion that much of the machinery could be examined on a running time basis and not on a calendar basis. He was sorry to have to refer to the Diesel engine again but it did illustrate the point. There were instances where a cylinder liner had worn out during the interval between surveys; the classification society concerned examined the liner when new and never inspected it again. The author felt that the frequency of examination should be more realistic and should be related to the life of the component. He was also very pleased that Mr. McAfee was able to publish the specimen record card. The full value of this type of record would be reaped in the future.

The author did not entirely agree that the finer points which Mr. Cassidy had quoted could not be effectively included in a schedule. What Mr. Cassidy probably had in mind was that even though written instructions were issued, the services of a reliable engineer were necessary to ensure that the instructions were executed in a proper manner, and with this the author would agree. Comprehensive maintenance schedules had been produced with equivalent refinements.

Although the author agreed that it was the maximum wear which determined the life of a component, he did point out that when a form was compiled the position of the dominant wear was usually unknown. Subsequent editions could and should be modified from time to time. The question of costing repairs was a very thorny problem and the author agreed that, the longer the interval, the nearer the average would be to the real costs. It was very difficult to generalize, as different companies used different methods in assessing the costs of repairs.

Mr. Rogers rightly pointed out that planned maintenance should be entirely divorced from incentive bonus schemes and other similar systems. However, a properly instituted system should eventually reduce charges as wasted effort was kept at a minimum.

* This paper, together with the discussion, appeared on pp. 37-58 of the February 1957 TRANSACTIONS.

Author's Reply

Mr. Falconer was very pleased to hear from Commander St. John that the planned maintenance organization with which he was associated had been dealing with ships as an entity for some time, and was pleased to learn that it was working successfully. Fortunately, he had the benefit of a special organization to deal with the problem. Many operators of merchant ships were not alive to the benefits which accrued. Commander St. John's views on the frequency of examination were extremely interesting. The author would agree that, in the Royal Navy, the calendar as opposed to a running hour periodicity would be more suitable. However, in the merchant service one obtained a fairly high number of running hours per annum, as would be expected.

Deck winches were maintained on a scheduled basis and were almost exclusively overhauled while the vessel was at sea, as the machines must be available for cargo handling in port. Mr. Falconer was indebted to Commander St. John for his very enlightening contribution to the paper and his views were all the more valuable as Commander St. John had been associated with planned maintenance in all its aspects for some considerable time and was aware of its benefits.

Mr. Baker's observations concerning the shortcomings of the manufacturer's maintenance manuals were very real. The author would very much like to see the marine industry taking a page out of the aircraft industry's instruction book. The aircraft manufacturers produced extremely comprehensive maintenance manuals which must greatly facilitate routine maintenance.

Mr. Falconer was very sorry that Commander Bott could not agree on the title of his paper, but confirmed that those aspects which Commander Bott had so neatly summarized were in fact carried out as part of the general organization. These features were purposely omitted as many people engaged on maintenance were conversant with this sort of thing. Many different methods were being successfully employed.

The author believed that the type of vessel described by Mr. Murray could be maintained efficiently without a periodic lay-up. The author's company was successfully operating vessels on a continuous basis with the type of machinery Mr. Murray alluded to.

The author would certainly favour the renewal of large bolts which were subject to cyclic stressing. Alternatively, they might be heat treated. Unfortunately, this process pro-

duced a hard scale which, when removed, destroyed the original good fit of the bolt and was, therefore, not a very practical way of dealing with the problem.

The crack detector was an extremely useful tool when properly applied. Unless the operator had the experience and could distinguish between cracks and scratches, then renewal at regular intervals was desirable. The author would certainly agree that standardization of electric motors was a desirable thing, but it was something that most progressive companies were very much aware of.

Mr. Perry's thoughts on the execution of repairs were most interesting and the author was sure that his views were shared by those people engaged in the maintenance of marine machinery. Mr. Perry appeared to be a little confused between the data sheets and the overhauling schedule. The author entirely agreed that the superintendent engineer's staff should prepare the latter; they were the only people to whom all the information was available. However, Mr. Falconer still believed, and Mr. Perry substantiated this claim, that engine builders were in a much better position to correct inherent faults in the design. As was well known, the design of many types of machinery remained unaltered over a considerable period of time and, while one was prepared to modify the first few models, they should not be expected to modify every single engine that was produced.

In general, the manufacturers' instruction and maintenance schedules were totally inadequate and often not in keeping with the quality of their product. It was rather interesting to note that manufacturers of gas turbines and the more advanced designs of steam turbines were very much alive to this shortcoming and were, in general, turning out extremely useful publications.

Mr. Perry's views on the machinery layout were something to which the author had given much thought and would entirely agree that accessibility and adequate handling of equipment were of paramount importance.

Professor Shone's contribution was indeed thought-provoking and the author could not but agree with his suggestions which, if implemented, would help to unify the thoughts and purpose of the staff, both ashore and afloat.

The author would like to thank all those who contributed to the discussion, which made the paper all the more worth while.

INSTITUTE ACTIVITIES

Minutes of Proceedings of the Ordinary Meeting Held at the Institute on Tuesday, 8th January 1957

An Ordinary Meeting was held at the Institute on Tuesday, 8th January 1957, at 5.30 p.m., when a paper entitled "Application of Research to the Design of Marine Steam Turbines", by T. W. F. Brown, D.Sc., S.M. (Member), was presented in his unavoidable absence by Mr. R. F. Darling, B.Sc. Mr. T. W. Longmuir (Chairman of Council) was in the Chair and 138 members and visitors were present. Seven speakers took part in the discussion, to which Mr. Darling and Mr. H. C. Wilkinson replied.

A vote of thanks to the author, and to Mr. Darling and Mr. Wilkinson, was proposed by the Chairman and accorded by acclamation. The meeting ended at 8.10 p.m.

Section Meetings

North East Coast

The Fourth Annual Dinner-Dance of the North East Coast Section was held on Friday, 8th February 1957, at the Royal Station Hotel, Newcastle upon Tyne.

The Chairman, Mr. W. R. Jones (Member of Council) and Mrs. Jones, Mr. John Bulman (Vice-President) and Mrs. Bulman, Mr. T. W. Longmuir (Chairman of Council) and Mrs. Longmuir received the guests, among whom were Mr. R. C. Thompson, C.B.E. (President of the North East Coast Institution of Engineers and Shipbuilders), Mr. Edmund P. Wilson (President of the Society of Consulting Marine Engineers and Ship Surveyors) and Mrs. Wilson, Mr. H. G. Cooper (Chairman of the Society of Consulting Marine Engineers and Ship Surveyors) and Mrs. Cooper, Mr. B. P. Ingamells (Director of Merchant Shipbuilding and Repairs), Mr. J. Calderwood (Honorary Treasurer of the Institute) and Mrs. Calderwood. Unfortunately, the Right Honourable the Lord Mayor of Newcastle upon Tyne was prevented at the last moment from attending.

The Chairman proposed the loyal toast. Thereafter, in deference to the presence of the ladies, the speeches were commendably brief and light hearted. The Chairman proposed the toast to "The Guests" and was able to spin a story about many of them. Mr. Edmund P. Wilson replied on behalf of the guests and it was felt that he really meant the nice things he said.

The toast to "The Institute of Marine Engineers" was proposed by Mr. R. C. Thompson, who pointed out that as he was a member of the Institute, he was in effect supporting his own in this task. His appreciative remarks were welcomed by Mr. T. W. Longmuir who replied for the Institute and thanked Mr. Thompson and the assembled company.

Dinner being over, dancing, to the band of Jos. Q. Atkinson, went on until 1.0 a.m. The balloons duly descended at midnight and sundry private parties went on until some hours later.

The whole event passed off with its accustomed smoothness and gaiety, reflecting the great care put into the arrangements by Mr. E. C. Cowper and the Social Sub-Committee. Those partaking numbered 245.

Northern Ireland Panel

A meeting of the Northern Ireland Panel was held on Tuesday, 19th February 1957, at 7.30 p.m., when Dr. T. W. F. Brown (Member) presented his paper entitled "Application of Research to the Design of Marine Steam Turbines". An interesting discussion took place after the lecture and many questions were asked.

Mr. D. H. Alexander, O.B.E., M.Sc. (Member) took the Chair in the unavoidable absence of Mr. C. C. Pounder (Vice-President) and about one hundred members and visitors were present.

A vote of thanks to the author was proposed by Mr. C. E. Blanc and seconded by Dr. R. Taggart.

Scottish

The Third Annual Dinner of the Scottish Section was held on Friday, 22nd February 1957, at the Central Hotel, Glasgow. Capt. N. J. H. D'Arcy, R.N.(ret.), presided, and some 360 members and guests were present, including Sir Donald Anderson (President), Mr. T. W. Longmuir (Chairman of Council), and Mr. J. Stuart Robinson (Secretary).

After the loyal toast, the Chairman welcomed all members and friends, and then introduced Mr. W. Logan, who proposed the toast of "The Institute of Marine Engineers in Scotland", which was replied to by Sir Donald Anderson. Mr. D. W. Low proposed the toast to "Our Guests" and this was replied to by Mr. W. P. Walker.

After the speeches, a conversazione was held until 11.30 p.m. The unanimous opinion was that it had been a memorable and enjoyable evening.

Prior to the Dinner, Sir Donald Anderson and Captain D'Arcy held a reception for members and their guests.

West Midlands

3rd January 1957

A General Meeting of the West Midlands Section was held at the Birmingham Exchange and Engineering Centre on Thursday, 3rd January 1957, at 7.0 p.m. Mr. H. E. Upton, O.B.E. (Chairman) was in the Chair and fifty-six members and guests attended.

Mr. A. W. Davis, B.Sc. (Member) presented an illustrated paper entitled "Reheating and the Marine Steam Turbine". He discussed the merits and demerits of reheat and direct cycle turbines and outlined the design and operational aspects of the reheat turbine. He then described in great detail the research work carried out, the manufacture and operation of one such marine installation and finally produced some impressive reports and data indicating fuel economies, high thermal efficiencies and performance.

Twenty members took part in a lively and interesting discussion; the Chairman thanked Mr. Davis for a very absorbing paper and the meeting closed at 9.15 p.m.

7th February 1957

At a General Meeting of the West Midlands Section held at the Birmingham Exchange and Engineering Centre on Thursday, 7th February 1957, at 7.0 p.m., Mr. P. Watson

Institute Activities

presented a paper entitled "Free Piston Engines". Mr. H. E. Upton, O.B.E. (Chairman) was in the Chair, and there was an attendance of eighty-four.

Mr. Watson commenced his lecture by giving a comprehensive description of the basic fundamentals of free piston engine design and a brief account of its inception and subsequent development. He then described the various types of unit now in operation and their performance to date. Finally, the author commented upon the application of the free piston engine, its scope and flexibility, with special regard to ship propulsion, and expressed the view that although a relative newcomer to the marine engineering world, it had in fact made considerable impact.

In the extremely lively and entertaining discussion which followed, some twenty members took part. The Chairman thanked Mr. Watson for a well delivered and highly illuminating paper and the meeting closed at 9.30 p.m.

Kingston upon Hull

On Thursday, 14th February 1957, a Junior Lecture was given at the College of Technology, Park Street, Kingston upon Hull, when Mr. R. S. Hogg (Member) delivered a lecture on "The Launching of Ships". About seventy marine, mechanical and shipbuilding students of the College attended, with a number of senior members. An interesting discussion followed the lecture and a sincere vote of thanks was proposed by Mr. D. Hodgson and passed by acclamation.

After the meeting the Institute of Marine Engineers' prizes were presented by Mr. F. C. M. Heath (Vice-President) to M. R. Thornton and H. R. English, the best first and second year students respectively in the Ordinary National Diploma Course organized in connexion with the Ministry of Transport Alternative Apprenticeship Scheme, and to I. Kaneps as the student taking the Higher National Certificate Course who accomplished the best year's work in heat engines.

Mr. J. G. Charlton (Chairman of the Section) presided at the meeting and the Principal of the College was represented by Mr. E. I. Harrison.

Junior Lectures

Birkenhead Technical College

17th October 1956

A Junior Meeting was held at Birkenhead Technical College on Wednesday, 17th October 1956, at 7.15 p.m., when Mr. J. D. Skelly gave a lecture entitled "Boiler Water Treatment". The Chair was taken by Mr. G. Moyes, B.Eng., Head of the College Mechanical Engineering Department, and the Council representative was Mr. C. W. Reed, B.Sc. There was an attendance of thirty-four.

The lecture was very well presented and illustrated and was followed by a discussion; the meeting closed at 9.50 p.m.

16th January 1957

On Wednesday, 16th January 1957, at 7.15 p.m., a Junior Meeting was held at Birkenhead Technical College. Mr. G. Moyes, B.Eng., was in the Chair, and the Council representative was Mr. C. W. Reed, B.Sc.; there was an attendance of thirty-eight.

An interesting and well-illustrated lecture was given by Mr. G. Yellowley (Member) entitled "The Steam Reciprocating Engine", dealing with the historical and present position of the steam reciprocating engine and especially with the modern developments which help to keep it in the forefront—superheat, reheat, the Fredrickstad steam motor, exhaust turbine and combustion chamber superheaters in Scotch boilers.

An animated discussion followed the lecture. The author was thanked by Mr. Reed and the meeting closed at 9.30 p.m.

13th February 1957

At a meeting held on 13th February 1957, at 7.15 p.m., there was an attendance of eighty to hear the lecture given by Mr. J. H. Gooch, B.A., on "Steam Turbines". Mr. G. Moyes, B.Eng., was in the Chair and Cdr. F. Roberts, O.B.E., D.S.C., R.N.(ret.), was the Council representative.

The lecture was of considerable interest, as was apparent by the number of questions asked at the end of the lecture and very ably answered by Mr. Gooch; indeed, only the limitations of local transport resulted in the meeting being brought to a close. A vote of thanks was proposed by Commander Roberts and passed by acclamation.

College of Technology, Byrom Street, Liverpool

A meeting was held on Friday, 15th February 1957, at 7.0 p.m., at the College of Technology, Byrom Street, Liverpool; Mr. W. Burrows, deputy principal of the College was in the Chair and the Council representative was Mr. K. P. Campion. There was an attendance of forty.

Mr. R. S. Hogg (Member) gave a lecture on "The Launching of Ships" which aroused a good discussion.

Election of Members

Elected 13th March 1957

MEMBERS

Andrew Pollock Beveridge
Joseph William Braithwaite
William Donald Brown
James Jennings Davison
William John Fraser
Walter C. Hadley
Reginald T. Hesketh
Frank Leonard Hiley
Albert George Howe
William Jack
Ronald Ernest Lacey
John R. Lindgreen
John William Longbone
George McCracken
Fred Armstrong Mackenzie
Basil Anthony McLean
Dennis Viner Middleton
Sinclair A. Miller, Cdr.(E), R.C.N.
William Henry Millican, Lt.-Cdr., R.N.
George Edwin Morris
Robert Johnston Murray
Karunakaran Kolazhi Nair
Niaz Ali, Lieut.(E), P.N.
Leslie Harold Norgate, D.S.C.
Max J. Peralta, Jnr.
Christopher William Peters
Cyril Ernest Prosser, Lieut.-Cdr., D.S.C., R.N.
Thomas Donald Russell
Leslie Cornelius Sandells, Eng. Sub.-Lieut., R.N.
Robert Schenck
James Daniel Scott
Harry Shipton
James Edward Smith
Robert Bell Smith, Snr.
Denis Glanton Stuart
William Alfred Taylor, Eng. Lieut., D.S.C., R.N.
Andrew Walker
Alexander Wilson
Frederick William Winyard

ASSOCIATE MEMBERS

Arthur Simpson Anderson
Edward Peter Duncan Binnie
Geoffrey Thomas Burton
Alfred Alan Corlett
Leonard James Culver, B.Sc.(Eng.)London
Denis Peter Cummings
Phillip Curtis
Robert John Donaldson
James Moir Duguid
Costas L. Fafalios
Oscar A. C. Fernandez
John Samuel Girling
Brian Loraine Greener

Institute Activities

Samuel Alexander Greer
Phillip Frederick Gresser
John Heighway
Sydney Hewison
Archibald Chapman Husband
Alfred Keith Illingworth
Kenneth Albert Lacey
Matthew Raymond Laws, B.Sc.(Durham)
George C. Lusztiq
John Blackburn Main
Philip Mason
Ronald Miller
Neilson George Craig Morris
V. S. P. Mudaliar, Lieut.-Cdr., I.N.
John Neocosmos, B.Sc.(Eng.)London
Stanley Thomas Parsons
Frank Peatroy
George Syme Rankin
James Ritchie Reid
George Malcolm Rockett
William Atkinson Rolfe
Leslie Roy Scamp, Lieut.-Cdr., R.N.
Alexander Murray Scrimgeour, Lieut., R.N.
Godfrey Alfred Smart
Louis Strauss
Ilmar Turn
Raymond William Ward
Sidney Victor Wildman
Desmond Thomas George Woon

ASSOCIATES

Reginald George Allen
Henry Carter
Paolo G. Casiraghi
John Lloyd Cook
Will Cooper
Ken Bryce Erskine
William Leslie Gillott
Johannes Grouwstra
Demetrios Nicholas Inglestis
Robert Leslie Jones
Ronald Alastair Jones
Robert Ronald Kippen, Capt., C.B.E.
James Middleton George Lochhead
Rosario Miranda
Andrew Daniel Sinclair
James Roxburgh Thomson
George William Thwaites
Alexander Miller Wilson

GRADUATES

George Robert Abbinnett
Norman Atkinson
William Bain
Luigi A. Bianchi
Michael John Blake
Ronald David Bly
Asim Chandra Bose
Charles Cairns
Douglas Gordon Champion
Thomas Edwin Colvin
Arun Kumar Dass
Robert Fredrick Eve, B.A.Sc.(Toronto)
James Brian Henderson
Thomas Richard Howell
Peter James Knowles
Robert McKee
Norman Minikin
Mohammad Razi Mirza, Sub.-Lieut., P.N.
Norman Frederick Mogg
Kazujo Nakayama

Arthur James Peavot
Hugh Gordon Rankine, Lieut.(E), R.C.N.(R)
Santokh Singh
Alan Edwin Savage
Akkaram Raghavachari Seshadri
Henry Smart Short, B.A.(Eng.)Cantab.
George Simpson
William Jack Gordon Smith
Thomas Jeffrey Stedman
Phillip Barker Wendell
James Whitby
James Michael Wilkinson

STUDENTS

William Granville Beck
Reginald George Bricknell
Ian Alvin Dedmen
Thales de Barros Freire
Norman Odin Hammer
Keith Ward Lawrence
Peter Tompkins Lyman
Stavror Maramenidis
Clifford James Plows
Robert Preston
Robert Thomson
John Keith Wilson

PROBATIONER STUDENTS

Alan John Bartrop
Ian Michael Boyes
Ewen Archibald Cameron
Anthony Howard Joad
John Michael Marshall
Alan Palmer
Keith Thursby Pollard
William Donaldson Reed
Peter Vernon Shaw
David Allen Smurfit
Roy Thompson

TRANSFER FROM ASSOCIATE TO MEMBER

Joseph Lawrence Hufton
John Weston Trenaman
Douglas Yates
Denzil Samuel Crawford
Kenneth Gordon McColl
John William Ellis Mansfield
Mohammed Iqbal Qureshi
James Henry Reynolds
Charles Herbert Stevens
John Watt

TRANSFER FROM GRADUATE TO ASSOCIATE MEMBER

James Delahunty
Clifford Edward Hand
Rory Macdonald
Robert Tatz

TRANSFER FROM STUDENT TO GRADUATE

Peter Robert Ralph, B.Sc.(Marine Eng.), Durham

TRANSFER FROM PROBATIONER TO STUDENT

Royston Lloyd Baker
Michael John Gibbons
Michael Ernest Glover
Colin John Edmund Jeston
Christopher Roland Alexander Meyer
Alan Miles
Michael Charles Mills
Joseph Marshall Wilson

OBITUARY

EWEN HENRY SMITH

An appreciation by Mr. James Calderwood, M.Sc. (Honorary Treasurer and Vice-President)

It is with deep regret that we have learned of the death of Ewen Henry Smith, Vice-President for Glasgow, on the 27th January 1957, at the age of sixty-one.

He served his apprenticeship with Earles Shipbuilding and Engineering Co., Ltd., Hull, and shortly afterwards joined the staff of Workman, Clark and Co., Ltd., Belfast, where he worked his way up through the engineering department until he was appointed a director in 1932. When the engineering department of this company was taken over by Harland and Wolff, Ltd., he joined Central Marine Engine Works, Ltd., West Hartlepool, and was with them from 1936 to 1945, when he was appointed Deputy to the Managing Director of David Rowan and Co., Ltd., Glasgow, taking over in 1948 as Managing Director and being appointed Chairman of the Board of that company in 1952.

Mr. Smith was a past Chairman of the National Association of Marine Engine Builders, and at the time of his death he was Vice-President of the Scottish Engineering Employers' Association, a Trustee of the Clyde Navigation Trust, Member of Council of the

Institution of Engineers and Shipbuilders in Scotland and of Pametrada, and a member of the Research Board of the British Shipbuilding Research Association. He was also a member of the General and Technical Committee of Lloyd's Register of Shipping and a member of the Institution of Mechanical Engineers, Institution of Naval Architects and the Institute of Marine Engineers.

In addition to his appointment as Chairman of David Rowan and Company, he served on the boards of a number of companies in the Glasgow area.

As a member of the Institute he was elected to the committee of the Scottish Section in April 1954, and became Vice-President for Glasgow in May 1955. During the same year he contributed a paper to the symposium on "Advanced Machinery Installations" in May 1955.

Mr. Smith had a large number of friends amongst marine engineers, shipbuilders and shipowners, all of whom will remember the friendly and helpful welcome they always received from

him and the straightforward manner of all his dealings.

His many friends will deeply regret his loss.

