National Historic
Mechanical Engineering Landmark

The American Society of Mechanical Engineers

Ferries and Cliff House Cable Railway, 1887
Howard C. Holmes (1854 - 1921)
Designer.

Commemoration Ceremonies
Friday, November 30, 1973


NATIONAL HISTORIC
MECHANICAL ENGINEERING LANDMARK
FERRIES & CLIFF HOUSE CABLE RAILWAY
1887
HOWARD C. HOLMES (1854-1921)
DESIGNER
MERICAN SOCIETY OF MECHANICAL ENGINEERS - 1973

COMMEMORATION CEREMONIES
for
THE FIRST ASME NATIONAL HISTORIC MECHANICAL ENGINEERING LANDMARK

The time was 10:45 in San Francisco on Thursday morning, November 30, 1973.

It was a long awaited day for the San Francisco Section of The American Society of Mechanical Engineers. Today, this Section of ASME and the History and Heritage Committee of the Society were presenting the first ASME National Historic Mechanical Engineering Landmark plaque to the City of San Francisco, honoring the Power House of the Ferries & Cliff House Cable Railway, 1887 and its designer, Howard C. Holmes.

The sky had been threatening all morning. A storm lying off the coast of Northern California for several days was just beginning to move in providing some very unwelcome sprinkles that later turned into even more unwelcome rain. Nevertheless, a crowd of between 60 and 75 dignitaries, ASME members and officers and friends of the Society gathered in the upper courtyard of the Cable Car Power House at Washington and Mason Streets - there to see the unveiling of this first ASME National Historic Mechanical Engineering Landmark plaque. Also on hand were 3 TV Channels, radio and newspaper people of the area.

Opening music was provided by a jazz band, much in keeping with San Francisco's gas light flavor - followed by these opening remarks by Bradley B. Garretson, Master of Ceremonies and Chairman of the San Francisco Section, ASME:

* MR. GARRETSON'S OPENING REMARKS

Ladies and Gentlemen:

Welcome to the commemoration ceremonies for the first National Historic Mechanical Engineering Landmark, sponsored by The Amerian Society of Mechanical Engineers and honoring the Power House of the Ferries and Cliff House Cable Railway, constructed in 1887, and honoring its designer, Howard C. Holmes.

This very San Francisco scene has been set not only by the weather but by the music of Squire Gersch and his Ramblers.

In our audience today we are honored to have distinguished members of The American Society of Mechanical Engineers, whom you will hear from shortly. Officers and executives of the Society whom I would like to recognize at this time are Dr. Rogers B. Finch, Executive Director and Secretary; Mr. John A. Talbott, Vice President, Region IX; Mr. Dudley Ott, Vice President, Power Department; Professor R.S. Hartenberg, Member of the History and Heritage Committee of the Society and Mr. George Gayer, Chairman, Region IX History and Heritage Committee.

This is perhaps the first mechanical engineering traveling road show (said as the Centennial Cable Car from which he was speaking was pushed back under the eaves out of the rain) - but, in a more serious vein, it's a time for honoring and for dedication. Today we are honoring a man and an idea. We are dedicating a system of machinery, complex for its day, still intact in principle, if not in all its parts. The Society is adding its collective and reflective voice to those who say that it shall and should be preserved for the instruction and admiration of future generations.

We are also honoring a Professional Society that has nurtured men of the character and stamp of Howard Holmes for nearly 100 years so that, today, members of this Society are manning the mainsprings of our technological society. Further, we are dedicating ourselves to maintain the trust of that Society, to adapt to changing times and to seek and find solutions to new problems. And, lastly, you yoursleves, both within and without the Society, are honoring us with your presence here and, particularly under these circumstances, we thank you for it.

To give meaning to today's event, we are privileged to call on a man dedicated to the Profession of Mechanical Engineering and who has served the Society with distinction, Dr. Richard G. Folsom, Past President of The American Society of Mechanical Engineers. Dr. Folsom:

DR. FOLSOM'S ADDRESS
("Mechanical Engineering Yesterday")

I would like to extend greetings to our visitors and members here this morning. The fog is a little thicker than usual but, just having returned from the east, we're still far ahead. But today, The American Society of Mechanical Engineers is inaugurating a program that will seek out and mark for the future those notable mechanical engineering structures and mechanical systems that have played a part over the years in the development of the United States.

The genious of the United States lies, in part, in the political and social institutions that have blessed us with an open society, but its genius has been no less manifest in the enterprise and skills of those who have shaped the physical surroundings that we enjoy today.

Of course, we have some temporary fuel shortages that are interfering and will interfere with our enjoying these surroundings. But, time will tell, possibly in ten years, the engineers will have us back on top so that we will be able to thoroughly enjoy the results of the enterprise and skills of the American genius. The plans and projects of the engineers have always been agents of change. The plans being made by engineers today will play an important role in our decisions, as a people, about the kind of future we want. Yet, tomorrow's world starts with today's.

The city of San Francisco is a good place to live today because of the work of engineers who, in earlier generations, planned and supervised the building of the city's vital systems that provide housing, light, power, water, sewerage, transportation, communications and other needs. The National Mechanical Engineering Landmark program marks the recognition by The American Society of Mechanical Engineers that our predecessors have taught us their skills and their enthusiasm. They have influenced the way in which we see our problems. We think it important to recognize in some lasting manner the contributions of those engineers whose vision has been responsible for the outstanding engineering systems.

To review very briefly, from an historical standpoint, we really have separated engineering activities before the 18th century and following the 18th century. Before the 18th century we had a craft community - a craft society. During that time, those concerned with engineering projects in many cases were dealing with military and engineers were important in that work. However, at the start of the 18th century, there developed a new kind of engineer which was differentiated from the military, the Civil Engineer - and I might point out that the Civil Engineers, as a profession, were organized in 1828 under the Institution of Civil Engineers in London. As has happened in history, the engineers have extended their activities and have further classified and specialized in particular areas and the Mechanical Engineers developed as a third group as differentiated from the Military and Civil.

The American Society of Mechanical Engineers was organized in 1880 so that we will be celebrating our centennial celebration in a few years from now. The Civil Engineers have already celebrated their centennial. However, as our life becomes more complex, the machines, the systems and the devices that we use have become more complex so we have specialized and developed other kinds of engineering. These include such areas as mining, of which Herbert Hoover is an example, electrical, chemical, aeronautical, automotive, industrial, materials - and I can go on, for there are several other classifications.

Basically, the engineers, by definition, have always been concerned with the application of science for the betterment of man in a practical way. This means to be involved with the technical feasability, with the reaction on man and with the reaction of the economics that are concerned. Over the years, most of the engineer's interest and attention has been focused on the technical aspects - always with the economic aspect in the background that must be justified. The engineers in their own way have had the human reaction to be considered - but under our present environment the reaction of humans is becoming more important than it was in the past so that, although the emphasis of some of the engineers most recently and in the future will be different, they are fundamentally the same. The engineer has always been concerned with these matters.

But, who are some of these engineers? Possibly, a few names: Leonardo da Vinci - a mastermind of his era, not only an engineer but a scientist, an artist, a musician - one of the best all-round men that we have ever produced. Newcomen, for mechanical engineers, is the man who introduced the steam engine. James Watt, the man who increased the efficiency of the steam engine through an analysis of its operation and the introdùction of new equipment - and he did this without the science of thermodynamics. He did it on a trial and error and logical basis. It has presented a problem to the scientists who, at a later date, came up with thermodynamics to explain the effects that had been obtained by James Watt in the improvement of the steam engine. We have Parsons, associated with the steam turbine. Mechanical engineers will recognize these names.

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Here in the far west we have had our engineering giants making their contributions. I'm not going to mention more than just two or three. One is Theodore Judah, a man who attended the Rennsalaer Polytechnic Institute, the educational institution in this country that gave the first engineering degree specificially designated as such in 1835. Theodore Judah designed and built railroads on the east coast, bridges - a forward engineering work of his time. He had a vision of a transcontinental railroad and pursued that throughout his lifetime. Of all the greatest names that are associated with the development of the railroads, Theodore Judah was the engineer; was the man on the job, who made it work and made it a reality. And here in San Francisco we are also interested in Pelton, who invented the Pelton wheel in California and planned the development for many, many important activities.

And then, today, we honor Howard Carlton Holmes who was a Civil Engineer, but fell by the wayside and got into mechanical transportation problems in developing the cable car and I should like to pay a personal tribute. As the results and the effects of engineers in the past, this cable car celebrated its 100th anniversary. How many pieces of mechanical equipment are in operation today after 100 years? It is an outstanding achievement but, in addition to that it is carrying a full load every day - and not just 100 percent but at least 200 percent, if you get the rush hour hang-ons. It has been doing this successfully. It's 50 years beyond its expected lifetime. The citizens of San Francisco have grasped on to the cable car as an expression - as a unique feature - of the City. We in engineering also indicate the cable car as a unique engineering achievement which has continued to operate for all concerned.

Well, you know I could go on and talk about engineers as individuals, but I think the main point I would like to leave with you is that an engineer, in many respects, is an artist. To make his creative contribution, he doesn't do it in paint - he doesn't do it in sound - he doesn't do it in form. He does it in equipment that does something for you and for me that makes our life easier and more enjoyable and makes us more effective in our operations.

I would just like to indicate one other thing of Mechanical Engineering in the past: There was a time when the river boats on the Mississippi River used to blow their boilers and blow up quite frequently. It was on a volunteer basis that the engineers took the matter in hand and studied as to why these steam boats blew up, with a loss of property and life. They developed boiler test codes - codes and standards for pressure vessels and pressure piping. This has been a great contribution by the mechanical engineers and there have been additional contributions by other engineers for the safety of our livelihood and our lives in this present day and age. I point out that this was done on a volunteer basis - and not under pressure or after the fact on insufficient scientific and engineering evidence - to give a practical reliable code and standard.

So the engineers - and I'm going to leave it to Dan Drucker as they go ahead - they have done a tremendous job on safety of product and safety of personnel in the past. They will continue to do so in the future. I think out of this you can see that I am more concerned about people being in engineering who are those that desire in a top way to make a contribution to humanity.

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In order to recognize what has been done in the past, our History and Heritage Committee has started this program, amongst others. And I would just like to end with that our heritage is a long one, one that we want to cherish and keep alive in the minds and hearts of our colleagues today and our successors tomorrow, and the general public as a whole. It is through a public ceremony - it is through this public ceremony - that we have asked our fellow citizens to join with us in declaring our debt to the past and our confidence in the future. (End of Dr. Folsom's address.)

PREPARATION FOR THE PRESENTATION

Mr. Garretson announced that Dr. Daniel C. Drucker, the President of The American Society of Mechanical Engineers, would present the Landmark plaque to the City of San Francisco. His distinguished career, well known to most present like that of Dr. Folsom, was given in resume.

Mr. Garretson also announced that Lt. General Stanley R. Larsen, United States Army (retired) and San Francisco Mayor Alioto's Assistant Deputy for Development would receive the Landmark plaque from Dr. Drucker. General Larsen, a native of Honolulu, is a graduate of the United States Military Academy, served four campaigns of World War II and rose from the rank of Lieutenant and Company Commander to Regimental Commander in the Twenty-fifth Division. During WW-II, he earned the Distinguished Service Cross and the Silver Star for Gallantry in Action and subsequently many other decorations and awards. In the past 16 years since becoming Brigadier General, General Larsen's career has been spent in Senior Command and Staff Positions, involving high level decisions in coordination with other Armed Services and Civilian Agencies. In the three years from 1968 to 1971, he was Commanding General of the Sixth United States Army at the Presideo of San Francisco.

DR. DRUCKER'S PRESENTATION OF THE PLAQUE

It is a great personal privilege for me to be able to participate in this first presentation for a National Mechanical Engineering Historical Landmark. We are especially pleased to have with us the immediate Past President of ASCE, our sister Society, John Rinne, in the back to participate and help us on this occasion.

May I ask General Larsen to come forward and accept this plaque on behalf of the Mayor and of the City of San Francisco.

GENERAL LARSEN'S ACCEPTANCE

Dr. Drucker, Dr. Folsom, Mr. Garretson:

It's a personal pleasure for me to be here representing the Mayor and first I would like to express his regrets for not being able to come here. I understand that this particular meeting today was postponed at one time so that the Mayor could make it and, having changed the date and the time, he then was forced to go out of town for today and he indeed sends his regrets and best wishes to everyone here in the Society of Mechanical Engineers and those who have joined with us this morning.

I can’t think of a more befitting compliment to the Society of American Mechanical Engineers than what they are giving to the city today in the way of this plaque. So many developments by the mechanical engineers are hidden behind hoods of automobiles and behind the facades of great buildings. But for nearly 100 years now, the cable car has demonstrated what mechanical engineers can do and have done successfully, as Dr. Folsom has expressed this morning, in the lasting measure to demonstrate what the mechanical engineers can do that people can see.

There are those in the city who can say or would say that the cable car is the longest, costliest, noisiest, most expensive piece of mechanical engineering that the city could possibly design and keep for posterity and I'm sure that Mrs. Klussmann in her own calculations would admit that this is probably the most permanent landmark that has ever been designed for any city. Quickly however, I might add that these same people would also add that it is the most joyous and most loved of any landmark that could be given to any city.

So, on behalf of the Mayor and all the people of San Francisco, I accept for them this wonderful plaque which I hope will help demonstrate whatthe mechanical engineer has done over the years and perhaps encourage and inspire young men coming along - and young women coming along - to take on this wonderful profession of mechanical engineering that Dr. Folsom so eloquently described this morning.

RECESSIONAL MUSIC

This having ended the formal ceremonies at the Washington and Mason Street Cable Car Power House, "Squire Gersch and his Ramblers" Jazz Band - composed of the Squire and 3 others borrowed from the Turk Murphy Band - provided a fitting ending to the happy occasion.

Many in attendance had never seen the very attractive Cable Car Museum and machinery viewing gallery on the floor below the courtyard - and took this occasion to do so. There they saw in full operation some of the real mechanical engineering today honored - the winding machines, now electrical but once steam driven - with the endless cables coming in from under the streets and going right back out again to pull the little cars "that climb halfway to the stars", up and over the hills.

ON TO THE LUNCHEON

Buses of the Municipal Railway of San Francisco then transported the attendees through the rain the four blocks or so to Joe Jung's Chinese Restaurant at the corner of Clay and Stockton Streets in San Francisco. Here, again in attractive surroundings, quite reminiscent of San Francisco past and present, they had a Chinese lunch of no small proportions.

THE HEAD TABLE

Following lunch, Chairman Garretson introduced those at the head table, beginning on his far left:

Mr. John W. Prud'homme, H & H Chairman, San Francisco Section, ASME
Mr. Dudley E. Ott, Vice President, Power Department, ASME
Mr. George F. Gayer, Region IX H & H Chairman, ASME
Dr. Rogers B. Finch, Executive Director & Secretary, ASME
Professor R.S. Hartenberg, Member National H & H Committee, ASME
Mr. John A. Talbott, Vice President, Region IX, ASME
Mr. Rino Bei, Mgr. Transit Improvement Dept., Municipal Ry. of S.F.
Mr. John E. Rinne, Immediate Past President, ASCE
Dr. Daniel C. Drucker, President, ASME
General Stanley R. Larsen, U.S. Army (retired), City of San Francisco
Dr. Richard G. Folsom, Immediate Past President, ASME
Bradley B. Garretson, Chairman, S.F. Section, ASME

Unable to be present at the head table was Professor E.S. Ferguson, Chairman, National History & Heritage Committee, who sent Chairman Garretson this telegram from Washington, D.C.: "Congratulations and best wishes for a successful landmark dedication ceremony. Much regret my inability to be present."

OTHER INTRODUCTIONS

Mr. Earl Chatterton, Cable Machinery Foreman, SF Municipal Railway -- our two "courteous, safe and effective" Muni drivers -- Mr. Maurice Jones, Manager, Information Services, ASME Staff -- Mr. Erich C. Weber, Assistant Vice President & Public Affairs Committee Chairman, Region IX, ASME -- Mr. Milo Price, Chairman, Committee on Relations with Colleges & Universities, Region IX, ASME and Mrs. Price.

Professor John Zickel, Senior Delegate to the National Agenda Conference, Region IX, ASME -- Mr. Danilo Herdocia, Treasurer, Sacramento-Sierra Nevada Section, ASME -- Mr. George A. Jacobsen, Chairman, Sacramento-Sierra Nevada Section, ASME - Mr. Kenneth E. French, Chairman, Santa Clara Valley Section, ASME -- Professor Harry Majors, Jr., Chairman, Western Washington Section, ASME -- Mrs. John E. Corr, Chairman, Mrs. Robert Steiner, Vice Chairman and Mrs. Kenneth French, Secretary, all of the San Francisco Section of The Woman's Auxiliary to the ASME.

Lt. Col. John Jewhurst, Jr., President, San Francisco Post, Society of American Military Engineers -- Lt. Col. Henry P. Ames, Jr. USAF, Regional Civil Engineer, U.S. Air Force -- Mr. Herb Menzel, Vice President, Mr. Robert H. Veldman, Director, both of San Francisco Section, American Institute of Plant Engineers -- Mr. William Denevi, National President, International Association of Power Engineers -- Mr. Marshall Silverthorn, who gathered historical data for event.

Messrs. J.W. Prud'homme, Chairman and Messrs. Jack Bailey, F.W. Beichley, William Brobeck, Thomas Lunde, Wendell Parker, Joe Van Overveen and Phil Nishakawa, all members of the History and Heritage Committee, San Francisco Section, ASME -- Messrs. F.W. Beichley, Dudley E. Ott, Joe Van Overveen, Al Greenland and Bob Spear, all Past Chairmen, San Francisco Section, ASME.

Three young ladies instrumental in this affair taking place: Mrs. Rosemary Marshall, Western ASME Field Services Staff; Miss Georgia Taylor and Mrs. Bobbie Centurion of Mr. Garretson's office.

DR. DRUCKER'S ADDRESS

("Designing the Future - A Role for Mechanical Engineering and ASME")

Dr. Folsom introduced Dr. Drucker, whose complete address follows:

At the Winter Annual Meeting I spoke about the World of Tomorrow and the role of mechanical engineering in terms more suitable for laymen than for engineers. I'll try to rephrase the reasoning and the main conclusions in our own language. In large measure this is to make sure that I know what it is I am saying. In part it is that you in turn will understand why I feel that most often the wrong boundary conditions are assumed; that as a consequence most pictures of tomorrow's world and how to get there are no more than wishful thinking devoid of true substance.

Let's adopt the broad view in a look 20 years into the future, and consider both the design of that future and design for that future. The approach is familiar and yet enormously more difficult as we go from design in the important yet narrow sense of a particular part, device, machine, or system to the design of complex sets of enormously large and interactive systems to meet a rather ill-defined and continually shifting set of societal goals. We need a statement of the objectives, an examination of the problems to be faced, and finally must propose alternative sets of solutions and the likely consequences of each.

The major objective in an approriately evolving and ever-changing design of the future transcends engineering but has a very strong engineering component. Because people are the designers, our basic goal is to guarantee the survival of mankind and beyond that to achieve a pleasant future and ensure its continuance.

An engineer should philsophize as an idealist, but must identify and propose solutions to problems as a realist. Therefore if the future is not to become the past before we take the steps needed, it is of crucial importance that the engineer think realistically about the likely situation in the world 20 years from now.

Twenty years from now is a long time off in one sense and a short time in another. It is long because, for the world as a whole, revolutions in technology as well as in political life and societal goals are not only possible, they can just about be guaranteed. While evolution is predictable in time and place with high reliability, revolution is not. Forecasting all the relevant aspects of the future involves such high uncertainty that planning ahead calls for keeping a variety of options open rather than concentrating only on the one or two which seem best to us now. Yet 20 years from now is a short time away because so much of the significant shape of that future is rather firmly fixed.

The dominant fact of that world of tomorrow is that the total population will increase by about 2 billion people. If we are lucky the rate of increase of population will be slowed by then. Perhaps luck is not quite the right word.

In any case, however, the 2 billion extra people will be around if a nuclear holocaust does not destroy most of us. This much larger population, including the almost negligible 5% who will inhabit the USA, will have to get along without a large increase in agricultural land and with a greatly reduced ease of access to fuels and all natural resources. Wishful thinking will have it otherwise, but no scenario of the future is viable which does not contain both the extra billions of people and the ever increasing difficulty of extracting resources.

Now we can, as engineers keeping these facts clearly in mind, begin to identify the key questions in design of and for the future. To focus the discussion and relate it to one of our primary concerns today, consider the questions of energy and materials supply and availability, and their consequences for productivity and the quality of life. By keeping our eye on a future 20 years away, we can ignore the present fuel crisis. After all, those in industry, government, and the public-at-large who through unknowing actions are responsible for the fuel crisis, have ignored us over the past decade or so. We can temporarily forget the abrupt shift to gas or oil of power plants and other large users of coal along with such other anti-pollution measures as smog controls on monstrous-size gasoline-devouring automobiles. We need not trouble ourselves with the lack of development of economical means of utilizing coal without associated pollution, and our inability to shift to very light automobiles with very high gas mileage, while we go through the 50 or 100 year long process of transition to a solar and a nuclear fusion powered society. By taking the long view we can avoid shuddering over the pretense that the present emergency requires immediate decisions to approve the Alaskan pipeline, coal gasification demonstration plants using rather primitive present technology, and licenses for many new nuclear power plants. These and a variety of other measures, some good and some bad, will have little effect for more than 5 years, while precious months have been lost in which actions could have been taken to avoid the severe dislocations we shall face this winter.

When we look 20 years ahead we have a variety of choices for our design. We may think of a design for all of mankind or a design for our country alone. We may choose the path of self-sufficiency at one extreme, or of total global inter-dependency and interchange at the other.

Self-sufficiency sounds callous, possibly evil, a selfish goal which ignores the well-being of the rest of the world. However, we are an importer of fuels and many scarce resources. Therefore, if we set self-sufficiency as our goal, the rest of the world benefits rather than loses. Fortunately, whether we adopt an extreme altruistic world view or an extreme self interest view, our design for the 20 years ahead will be much the same. Altruism or self interest both lead to the conclusion that we must expand our innovative technology and our productivity to the greatest extent we can. Surely, if our objective is to raise the standard of living of the poor in our own country and the billions in the underdeveloped and less developed countries, we will contribute enormously more through continual advance than through standing still.

Our position in the world and the considerable freedom we have to determine our own fate today is a consequence of our high agricultural and industrial technology. Despite our small population, we produce a very appreciable fraction of goods and allied services, about 30%. However, like population, the total volume of goods produced elsewhere in the world is on an exponential growth curve.

Our dominance as consumer and as producer is bound to fade away with time.

If we choose to keep our production and consumption at present levels, a course recommended by many well-intentioned and concerned groups because our environment is threatened and our affluence is amply high on average, in 20 years we would no longer be much of an influence for good or evil in the world. With 5% of the world's population and about 12% of its productivity (all of it needed at home for our own people) we could be ignored safely by everyone, and would be ignored except when they wished to direct us. In time, with some certainty 120 years from now, that will be our situation. But we can look forward to world peace and stability by then with most peoples of the world sharing reasonably equitably in the world's goods and services. A mere twenty years from now we shall certainly still be in times of apparently irreconcilable conflict, with billions of people still in dire poverty.

To see clearly that world energy demands will skyrocket no matter what we decide to do, let us suppose a rather docile world population willing to live on a scale just a little better than today's miserably low level. Then consider the combination of an increase of 2 billion in population and the need for much more intensive energy usage in the production of food and goods because of the continually decreasing ease of availability of land and resources. A minimum estimate is that the world yearly energy demand will double in 20 years. My own guess is that unless it triples we shall not have sufficient political stability; our design then would fail. Although we in this country are enormous users of energy per capita, our relative population will be so small that were we to maintain our present use or instead grow along with everyone else, the world total would be but marginally affected.

What about the severe dangers of pollution and the terrible depletion of the world stock of resources? Pollution is contained only temporarily by national boundaries on the time scale we must consider and the use of resources by others will dwarf our use, so that once again what we do for ourselves alone will have only a minor effect on the world as a whole. The problems to be solved are far from trivial. Surely, however, with our advanced technological ability we can be far more efficient than most other countries. Therefore, if our design objective is the cleanest, most prosperous, most viable world, our course is clear. If instead our objective is to maintain the strength and power of this country until such time as international cooperation instead of deadly competition is assured, our course is equally clear and much the same; innovative technology must be developed over the entire spectrum of our economy.

A decision for zero or much reduced economic growth often is urged upon us by many sincere people. It might indeed make for a more enjoyable decade or two for those of us who live in affluence and comfort in this country and abroad. Are we willing to advocate a design plan which will sacrifice the long range future of our own people as well as the peoples of the world for the short range pleasure of those, who like us, constitute a temporary elite? Of course, even with a goal of zero population growth and zero per capita growth in economic output, we would have to improve our technology significantly to accommodate our population increase of at least 25% and the increasing inaccessibility of easily available resources.

A totally unacceptable alternative, which I simply reject out of hand, is for us to band together with the other highly developed nations of the world in an attempt to keep the world population, energy usage, and consumption status quo through economic, political, and military force. Only then could we go to zero growth with but modest improvements in present technology. I reject this ultimate solution vehemently on moral and ethical grounds, and observe with sorrow that those who propose it in a variety of disguises do not recognize that the aspirations of the have-nots cannot be contained for long in tomorrow's world.

The conclusion I draw is that, whether we are altruistic or selfish, our best design for the future is to continue our economic expansion at a rate governed by the pressure of world population, not our own population.

What about the role of mechanical engineering and ASME in the future? The world and the USA in particular will have to generate enormously more power and be a far more efficient user of energy and materials. These are areas central to mechanical engineering so that mechanical engineers must play a key role on a much expanded scale. Formal education must prepare them properly to enter the profession, and continuing education keep them up-to-date.

The list of major problems facing our profession along entirely traditional lines is almost endless. Resources must be conserved while production must be increased significantly in this country and manyfold in the world. Research and development are needed at all levels in all areas of forming, joining, machining, and deformation processing to produce machines and parts with available but far more troublesome materials at a permissible risk of failure. Instrumentation for non-destructive testing and general quality control is in urgent need of development. Noise levels of machinery on the farms, in the streets of the city, in the air and on the highway, and in industrial plants are unacceptably high and must be reduced through research, and innovative development. Industrial plants and power stations must be made into good neighbors through control of pollutants, both visible and invisible, thermal as well as chemical. Environmental control of buildings through air conditioning, heating, humidifying, and acoustical insulation will have to develop from an art to an efficient science. Fundamental understanding will have to be achieved on the initiation and spread of fires so that safety can be combined with economy of material. Product liability laws will soon demand a level of anti-failure engineering for new products which is impossible today at reasonable cost. Design for ease of maintenance and reuse of material also will be universally required.

The traditional purely technical problems we shall continue to face could keep all of us busy for more than full time, and so we shall be unable to do but a small fraction of the things worth doing. Grave ethical questions will plague society and the engineer in particular. Priority choices to be made 20 years from now in the design of the then future will be very much more difficult because they will occur with increasing frequency and be very complex in scope. Errors in judgement are all too likely and yet any one may have world-wide catastrophic effect.

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As the standard of living goes above the point at which bare subsistence cripples activity, the demand for a better life by billions will be translated into political action and require an answer. The basic design assumption I accept is that the sooner this better life is achieved, the sooner population growth will cease, and the smaller the world population we shall have. A simple sharing of goods and services will be no answer tomorrow, as it is no answer today, because all would then be impoverished and there could be no hope for a better future. World-wide agricultural and industrial mechanization are essential but the resource and energy requirements boggle the mind. The technology needed tomorrow does now exist today, -- its shape can barely be perceived. Priorities will have to be set which are understandable and reasonably acceptable to all of mankind. Mechanical engineers and ASME will have to do their share in this awesome task.

ASME must organize to meet the challenges of today and the immense problems of tomorrow. Our present first steps are but baby steps, yet they are as difficult for us now as the giant steps of the future will be then. Technical information generation and availability pose staggering problems for us. More and more we must be prepared to make studies and offer advice to the legislative and executive branches of government on societal problems with high technological content as well as on purely technical matters. As the scope and complexity of the problems we must address continue to grow exponentially for many years to come, the strain on the intellectual resources of the nation will greatly exceed the severe strain on our natural resources. Once again conventional wisdom is in error. If there is an area in which we in this country must give priority consideration to limits to growth, it lies in educated manpower not in physical limitations. (End of Dr. Drucker's address.)

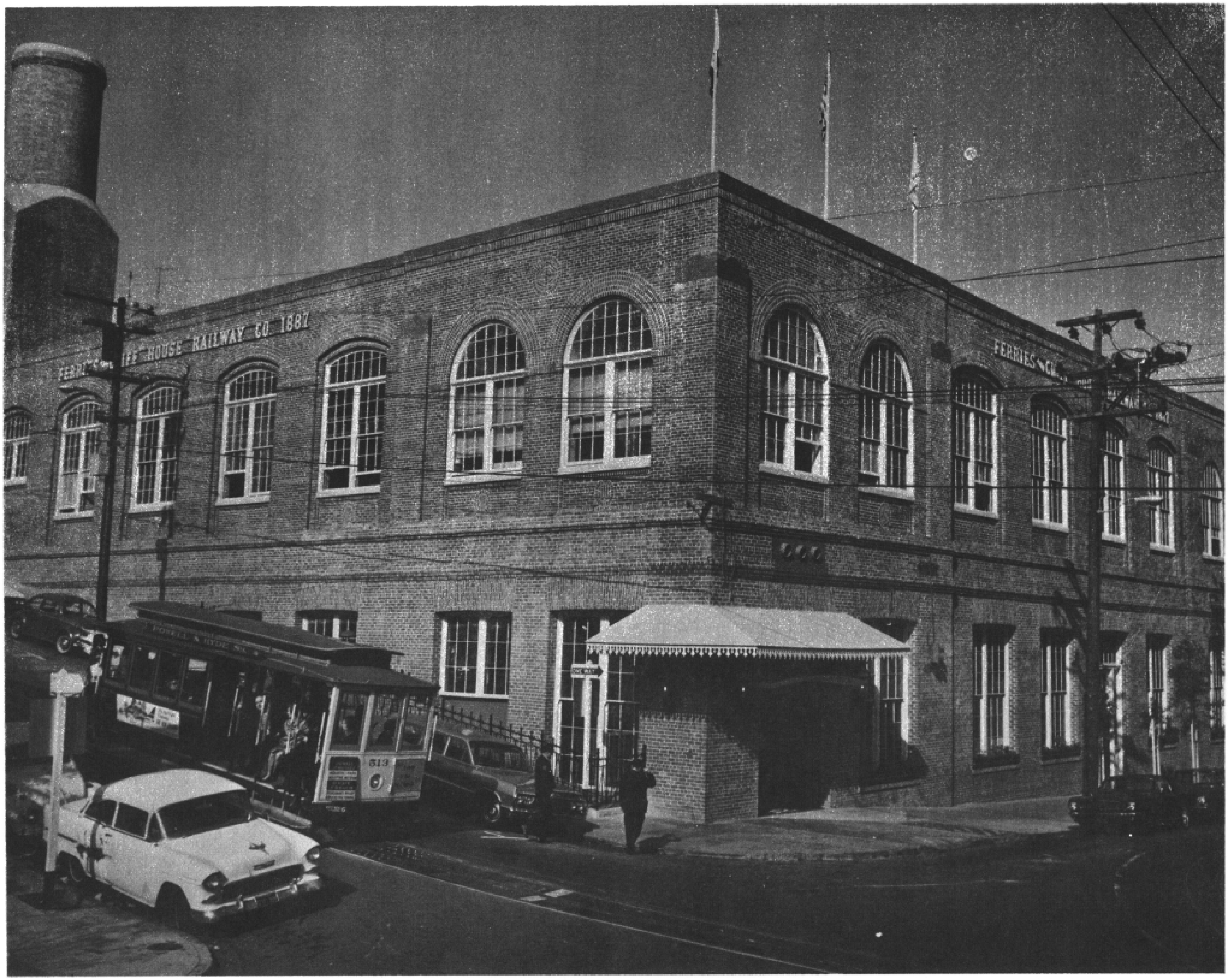
Mr. Garretson closed this ceremonial luncheon by announcing that TV Channels 2, 5 and 7 were the ones on the dedication site at the Power House and urging all to watch their TV's tonight.

NATIONAL HISTORIC
MECHANICAL ENGINEERING LANDMARK

FERRIES & CLIFF HOUSE CABLE RAILWAY
1887

HOWARD C. HOLMES (1854-1921)
Designer

AMERICAN SOCIETY OF MECHANICAL ENGINEERS - 1973


HOUSE RAILWAY CO. 1887
FERRIES
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