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The Presidential Address

ASHRAE Technology and the Human Destiny

President H.E. "Barney" Burroughs examines the emerging challenges facing the Society, the profession and the industry in the coming years

The complete text of the inaugural address delivered at the Annual Meeting, American Society of Heating, Refrigerating and Air-Conditioning Engineers

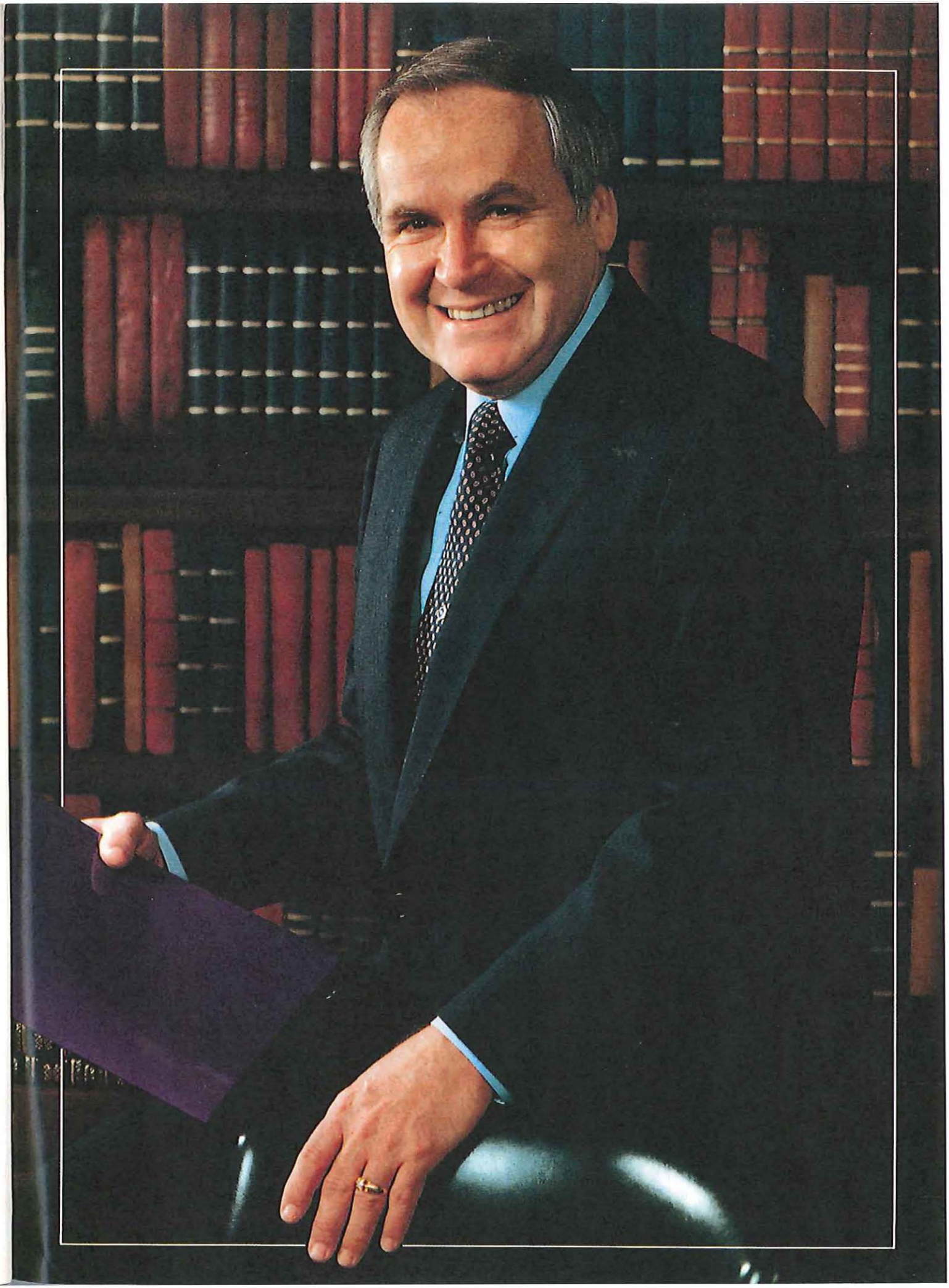
FELLOW OFFICERS, FELLOW members, spouses, and friends of ASHRAE, since the dawn of man, the engineer, ASHRAE and its technology, and members of the HVAC&R industry have built upon nature to change human destiny.

Yes, there have been challenges: met, resolved and onward to the next. Leaving us a pattern of conquest—of mind over matter—of order out of chaos—of technology and system over nature—an indelible mark on the destiny of mankind. This year's presidential theme, *ASHRAE Technology and the Human Destiny*, however, addresses both sides of an equation: what has been and what is to be. And on the latter side of the equation, what are the emerging challenges to our Society, our profession and our industry. In the next few minutes I can only iterate the major issues facing us and I'll focus more on questions than answers . . . But in that process we can identify together the direction and the role of your Society in the years ahead, carrying us into the next decade and, all too soon, the next century.

Restoring competitiveness and quality

The first challenge: *competitiveness.* A popular buzz word—called otherwise "quest for excellence;" quality; "you will know it when you see it;" productivity; and cost effectiveness. To you and I as consumers, it means products that work, systems that perform to desired design levels . . . and that keep on working to expected life cycles. To our economy it means . . . survival. *Business Week* calls it "the dilemma of a society that is living beyond its means" and suggests ways "to restore U.S. productivity and competitiveness." As their answer, Peters and Waterman point to management

H.E. "Barney" Burroughs is retired from Purafil, Inc., Atlanta, Georgia. He was installed as 1987-88 president of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. at the June 1987 Annual Meeting of the Society. He joined ASHRAE in 1967 and has been a member of the board of directors since 1980. Completing his recent term as president-elect, he served as chairman of ASHRAE's Regions Council and the Exposition Policy and President-Elect Advisory Committees. Previously, he served as a Society vice president and chairman of ASHRAE's Technology Council and Member Council. From 1983-85, Burroughs was Society treasurer and chairman of the Publishing Council. He also has served as chairman and director of Region IV, vice chairman of research promotion for Region IV, and chairman of TC 2.3. In 1984, he received the Society's Distinguished Service Award. Burroughs founded Purafil, Inc., a manufacturer of gaseous filtration equipment and systems, in 1968. Previously, he worked for the chemical division of Borg-Warner Corporation and for Dow Chemical Company in polymer sales. In mid-1983, Purafil aligned with the Larkin Group, manufacturers of air conditioning and refrigeration equipment and components.



skills, tactics, and style in their "In Search of Excellence." I think they missed the mark. The challenges in the competitiveness, cost effectiveness, and quality of our products and services will be solved by more engineers, better trained engineers, and better engineering—not by more MBA's, financiers and lawyers in management. It disturbs me to see this nation trail behind in crime prevention, health care, nutrition, literacy, life expectancy; we're not even number one in arms export. But I am least proud of the fact that we are the number one exporter of trash—not technology—metal, paper, fabric waste. Engineering must help us meet this challenge. Easy to say (and probably a popular thing to say, at least in this room), not so easy to do but we must do it.

Improving our educational system

This leads us to the next challenge: *education.* For where do engineers come from? It starts in "K" thru "12" and teaching basic scientific skills—reading, writing and arithmetic. I've heard the opinion that our really good high school graduates are better than ever but that lower ones are worse than ever. Show me an average high school graduate today who voluntarily reads more than one book a year (average for this country), who's writing is readable without reverting to primer level printing, and who can make a simple change without a calculator, and I will show you an exception. Lester Murow of MIT says it, "Their bottom half is beating out our bottom half." And remember, only 70 percent of them graduate. There is not a state or a province in this continent that does not need your help in improving high school educational systems.

Why is this our problem? Because only when our children have learned the basic tools can we teach them how things work, like sound, electricity, oxidation, weather, heat transfer and radioactivity; and then, and only then, the telephone, the computer, a car, a rocket, an air conditioner and a nuclear generator. Solve this basic problem and you build a basis for expanding our inventory of engineers and technologists. It would even help to do as the *Wall Street Journal* suggests, "A change in teaching practices will have to be part of the solution. That is not to say that every MBA needs an undergraduate degree in engineering . . . but they . . . should be able to understand scientific arguments . . ." And I would add parenthetically that the engineer should understand the humanities. ASHRAE can then address the challenge of increasing those entering our industries and enhancing their applied skills through our continuing education efforts.

Taking responsibility as an industry

A stepchild of our educational deficiency is another challenge to the engineer: *credibility.* Engineering and technology have suffered major death blows in recent times. The Chemicals: Bopal killed several thousand; The Nuclears: the threat of TMI and then the harsh reality of Chernobyl affected hundreds of thousands—maybe even generations; The Automotives: less traumatic but just as significant—our greatest industry loses leadership in style, quality, value and marketshare; And the Aeronauticals: (perhaps the harshest blow of all to us Americans) as all of us watched our sweetheart teacher blow asunder along with the Challenger.

The conclusion by the technologically ignorant public, the product of our educational systems, is twofold. First, that engineering and technology has failed to protect them, and secondly, that the risks of technology are not worth it. The expectation of the general public is that engineering, technology, and our products and services must be absolutely risk free. Nor is our industry free from being tarred with the same brush—ask yourself how many construction jobs are free from tort suits or threatened litigation. Whether it is leading-edge technology and its products not yielding specified performance levels, or a building developing tight building syndrome, we have the problem. What can we do as individuals and as a technical society about the credibility problem?

First, speak out, or said differently, *be heard*! Shout if necessary. Then, take a *position.* The Challenger incident occurred because the engineer was not heard and the financial guys in management were. IAQ problems occur when it's stated, "We don't need that much outside air or that much filtration;" "Besides we will worry about that after we have rented the space;" "Can't do because the bankers have already decided how much to spend on HVAC;" or even worse, "I am sorry you don't have the room to do it right." In such a world, the engineer must speak out, lest others be heard.

Second, *communicate the risk.* As an industry, as a technical society, and as practicing engineers in all phases of our industry we must "tell better" that technology is not risk-free and "sell better" the benefits and long-term costs/values of leading-edge products and engineering services. The building owners and operators must know, for example, that more elaborate equipment or controls may require more competent and dependable maintenance. I've heard that an engineer is someone who measures things in micrometers and then cuts them with an ax. We must communicate better . . . with a finely-tuned edge.

And third, *be accountable.* Taking ownership of mistakes and taking positive action to correct them is good advice for both the manufacturer and designer. By saying "That was not my job;" "You didn't pay me for that;" "installed improperly;" "maintained poorly;" "equipment was downsized;" and all of that finger pointing usually ends up in your lap and you are accountable anyway, at least in the eyes of the court. And next time the owner will simply ask, "Why not buy an imported 'brand X' and install it ourselves?"

To paraphrase from *The Civilized Engineer* the author says, "that doctors bury their mistakes and architects plant ivy, Engineers have no such easy evasions; they have to cope with the devilish phenomenon of metal fatigue." Thus, a principal feature of the engineering view becomes the willingness to accept responsibility.

Meeting the technological challenges

Then the challenge to our *technology*: In the past, ASHRAE presidents have steadfastly pledged emphasis on energy management, and the Society has fulfilled that pledge by focusing on good energy management practice through our energy awards program and continued diligence in development of the Standard 90 series. This has been difficult since energy is now more available and more reasonable. Owners ask, "Why spend the money to comply with the Standard 90's further reduction?" The challenge is to withstand these pressures because 1990 and 1991 are soon upon us. Many experts feel that by then the situation will have reversed and those same owners whose buildings are on the boards now, will be seeking tenants then.

Another challenge to our technologies is the *CFC issue*: a nice, benign, inert, nontoxic, cost-effective family of chemicals—indicted and guilty by suspicion of robbing our earth of its protective ozone layer. Our industry needs con-

servation practices and guidelines, we need alternative refrigerants, with then toxicity, ecological, and thermaldynamic properties, as well as compatibility and long-term stability data.

The challenge of *indoor air quality*: formaldehyde, radon, cigarette smoke and asbestos. We need hard exposure data, including safe levels, ventilation efficiency data, diagnostic techniques and guidelines, remedial practices, evaluation or monitoring equipment, and even some accurate product testing methods and performance data.

The challenge to *refrigeration technology*: the heartbeat of much of our technology and our products. To emerging nations—most of our world's population—food and food preservation is a "slightly" higher priority than air conditioning. Our challenge there is to position that technology back into the main stream of the Society and to support the emerging needs of refrigeration technology exchange.

Our technology is for people

And then the challenge to cope with *geometric growth* of all of the indicated *research* needs that I have just listed, as well as this related funding. Just think! The challenge of creating environments in space and under oceans. The challenge of controlled environments in produce storage, and how about low Kelvin refrigeration and super-conductor technology. The challenge to the private sector and to ASHRAE is to find a means for funding these exploding research needs that is supplemental to our highly successful grass roots activities. It will take millions to create the required generic research.

Yes, the matrix of these challenges is the human touch and the reminder that our technology is for people. Our research and new knowledge has to be communicated to people; has to be accepted by people; has to be used by people; and has to be paid for by people. Not knowledge for knowledges' sake, but for humanity for mankind. Call it the challenge of humanism of engineering: for want of a better name—a challenge to turn theoretical into comfort and lifestyle for the common man. To turn creativity into products that work better for consumers. To turn esoteric into practices that help operating engineers do their jobs better.

Shaping human destiny

The Last Great Challenge . . . *keeping the dream alive*: Ours is one of the most entrepreneurial industries in North America. Think of it: the consulting practices, the representatives and distributors, the contractors and dealers, the service companies, the small manufacturers—thousands of enterprises—most closely held. All having been created and built by entrepreneurs doing their thing. Even many of the large, major firms in our industry carry their founders' names—many pioneers in our industry. And many of those people are you in this audience. Heavy supporters of your technical society and your community, believers in the process of putting something back. Trustees of the great American dream . . . The challenge—keep it alive for our kids—that's your challenge.

Yes, there have been challenges and we have conquered them. Yes, there are challenges before us even now and I mentioned only a few, and yes, there are even more lurking ahead. Not without risk, not without investment of dollars and time and effort, and not without dedication and commitment . . . But ASHRAE, its technology, and you, its members, will shape the human destiny. ■