

A CONVERSATION WITH:

Fred

Fred Finn is a retired asphalt industry engineer who is considered by many to be “the father of pavement preservation.”

■ *How did you get started in asphalt?*

During the Second World War, I was with the 125th Naval Construction Battalion, which was part of the operation on Okinawa. We had to upgrade the runways and taxiways from coral to asphalt. I was involved in the surface paving of the airfield.

My next assignment as an engineer was sampling and testing soils for an earth-filled dam in the high Sierras for a utility company. After that, I went back to the University of California (U. of C.) for a graduate degree in Soils and Foundation Engineering. While working as a teaching assistant at U. of C., I was assigned to the Soils and Bituminous Laboratory to assist the director of asphalt research, Barney Vallerga.

■ *What was the next step in your career?*

During the Korean War, I was recalled to active duty and assigned to the 11th Naval District Public Works Office in San Diego. The Navy was in the process of upgrading all of its airfields to accommodate high-pressure tires and jet blast, but the 11th District had very little expertise in pavement design and asphalt mix design. So the Navy sent me to Vicksburg, Miss., for training in mix design using the Marshall method and then to Washington, D.C., to learn how to design pavements—both Portland Cement Concrete (PCC) and asphalt.

In 1953 I returned to the U. of C. as Assistant Research Engineer in charge of the Soils and Bituminous Laboratory. This combination of university work and working with the Navy got me started in pavements.

■ *When did you work for the Asphalt Institute?*

From 1955 to 1964 and from 1968 to 1971. My first tour began in 1955 when Barney Vallerga, who left U. of C. to become the Pacific Coast Division Engineer for the Institute, hired me as a District Engineer.

Not long after that the Institute asked me to work with A. C. Benkelman [Benkelman Beam] in the “Flexible Branch” on the American Association of State Highway Officials (AASHO) Road Test in Ottawa, Ill. The four years I worked there opened many doors and afforded many contacts in the asphalt industry. When the AASHO Road Test was completed in 1960, I went back to the Institute.

■ *What were some of the results from the AASHO Road Test?*

One result was that the Institute president, Jess Buchanan, decided we should use the data from the Road Test to upgrade the Institute’s Pavement Design Manual (MS-1). Using the Road Test data, a new MS-1 was published in 1963 using Full Depth as a basis for structural design. The idea of Deep Strength® and Full

Depth® asphalt came from the findings on the Road Test special sections, which incorporated thick sections of asphalt placed on four inches of subbase. These sections performed well and the asphalt industry immediately took steps to take advantage of the test findings. Francis Hveem from the California Division of Highways was responsible for the inclusion of the special sections in the Road Test.

■ *When did you do your second tour with the Institute?*

My second tour with the AI was from 1968 to 1971 as Pacific Coast Division Staff Engineer. Vaughn Marker was the Division Engineer and my boss. My duties included providing general assistance to field engineers in the Division and also to assist Vaughn. I learned more about asphalt construction from him than anybody. I also learned never to wear a white shirt or necktie when I worked with Vaughn because he was always crawling through hot mix plants to ensure they were operating properly.

■ *How did you get into pavement management?*

To some extent the idea of predicting performance was an outgrowth of my experience on the AASHO Road Test, where prediction models for ride quality for the Road Test sections were developed as a basis for the Institute’s MS-1. In 1972 I was invited to make a presentation to the California County Road Commissioners. The presentation was in essence an introduction to

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pavement management. I hypothesized if road engineers could predict the future performance of pavements, it should be possible to determine when maintenance and rehabilitation would be appropriate and what kinds of investments would be the most economical for their preservation.

Roger LeClerc with the Washington State Division of Highways was a speaker on the same program. He described Washington state's ongoing rating system based on pavement condition surveys. Roger and I concluded that Washington's database would be a great starting point for a pavement management system (PMS). The idea was to predict the performance of in-place pavements, project by project or mile by mile, and to evaluate alternative maintenance strategies that would maximize long-term benefits and minimize life cycle costs. The Washington DOT PMS manual was first published in 1978.

■ *How did you approach the Washington PMS program?*

It's important to recognize that it takes a team of specialists, a multi-discipline approach to develop a pavement management system. My role was to assemble the team, including a statistician familiar with model development, someone knowledgeable in optimization theory, a good programmer and database manager, and a pavement engineer who was familiar with condition surveys, pavement



performance in various categories, as well as appropriate pavement preservation methods. I was the overall project manager.

■ *Did you do other PMS programs?*

With the team effort and cooperation from the states, we were able to develop a project level PMS in Washington and a network system in Arizona and Kansas. A more comprehensive version of an Infrastructure Management System was developed for Saudi Arabia.

The network PMS is much more difficult, both from a formulation and computational aspect, because the number of budget and performance alternatives and constraints is significantly greater at the network level.

■ *You were one of the first to be involved in "mechanistic design."*

Gene Skok and I presented a paper at the First International Conference on Structural Design of Asphalt Pavements that suggested strain in the asphalt concrete and stress on the subgrade were related to performance and could be the basis for structural design. Most of the technology we used was actually based on research in England and by Royal Dutch Shell in Amsterdam. The Europeans were ahead of us in this area at that time.

In the following years, I had the opportunity to explore the use of mechanistic methods correlated with empirical performance information and to co-author a number of papers on the use of what we called empirical-mechanistic

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design criteria for the structural design of asphalt pavements. AI revised its MS-1 based on these criteria. This work was a joint effort by Matt Witzak, Jim Shook, Carl Monismith and me.

In Highway Research Board (now TRB) Record 239, Gary Hicks, Bill Kari, Lloyd Coyne and I developed a mechanistic-empirical method of design for Chevron using emulsified asphalt treated bases. At the same time, engineers in materials, research and development were using mechanistic design for several large airfields in the U.S. In consultation with Carl Monismith, we used these methods for the design of runways and taxiways at the Riyadh and Dhahran International Airports in Saudi Arabia.

Steve Seeds, Gary Hicks and Ron Terrel. The Guide was published in 1986 and is still in use although Matt Witzak and others are in the process of upgrading its design for use with mechanistic-empirical models.

■ *How were you involved with the Strategic Highway Research Program (SHRP)?*

Professor Carl Monismith and I were co-principal investigators for the U. of C. at Berkeley for one phase of the project defined as Development of Performance-Related Specifications for Asphalt-Aggregate Mixtures. Carl was the major player on this project and I supported him, particularly as regards pavement performance based on new material properties and mechanistic procedures that were developed by Carl and his staff. He was attempting to identify and measure the basic properties of asphalt concrete that control pavement performance. He did a terrific job and perhaps someday his research will be the basis for the design of asphalt pavements.


■ *What are some awards you received throughout your career?*

Being elected to the National Academy of Engineers in 1993 was the most memorable, but being named to the AI Roll of Honor was great too. Also memorable was being named an Honorary Member of the Association of Asphalt Paving Technologists (AAPT) and of ISAP. And, in 2003, being selected as a Member Emeritus of the TRB Committee on Flexible Pavement Design in 2003 was very gratifying. ▲

■ *What was your role in producing the AASHTO Guide for the Design of Pavement Structures?*

In 1984, NCHRP asked Dr. Frank McCullough and me to put together a team to upgrade the Interim AASHTO Design Guide, which had been based almost exclusively on the results of the AASHTO Road Test. Our task was to include new research and broaden the scope of the Guide. The new Guide included a better description of material properties, drainage factors, seasonal factors, reliability associated with design, plus other additions.

Frank was the team leader for concrete pavements and I was the leader for asphalt pavements. Some of the players that will be recognized include Matt Witzak, Bob Lytton, Ron Hudson, Paul Irick, Carl Monismith, Mike Darter,



Fred Finn at the first Ann Arbor conference in 1967.