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CONVERSATION WITH A MASTER: CLARKSON W. PINKHAM*

Interview by
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1. BIOGRAPHY

Clarkson W. Pinkham, known affectionately as ‘Pinky’ to his friends and admirers, is a Los Angeles native. He served our country in the U.S. Navy during World War II and attained the rank of Lieutenant Commander. He retired from the Naval Reserve in 1954. Pinky graduated from the University of California at Berkeley with his Bachelor of Science degree in Civil Engineering in 1947. After graduation, Pinky joined the firm of S. B. Barnes and Associates, a well-known consulting structural engineering firm in Los Angeles. As an aside, the late S. B. Barnes had the distinction of being licensed as Structural Engineer No. 1 in the State of California. Pinky is currently President of the same firm, now known as S. B. Barnes Associates.

Pinky is licensed as both a Civil and Structural Engineer in the states of California and Washington. He is licensed as a Structural Engineer in Illinois and Arizona; he is also a licensed Professional Engineer in the states of Florida, Georgia, Indiana, Iowa, Kansas, Maryland, Oklahoma, Oregon, Texas and Wisconsin.

Pinky is a member of countless professional and civic organizations. Most notably, Pinky is a member of the Structural Engineers’ Association of Southern California, a life member and fellow of the American Society of Civil Engineers, a member of the International Association of Bridge and Structual Engineering, a member of the Board of Directors of the Earthquake Engineering Research Institute, a former member of the Building Seismic Safety Council, a member of the American Welding Society, a member of the American Society of Testing and Materials, a member of The Masonry Society, a member of the Structural Stability Research Council, a member of the American Arbitration Association, a member of the Seismological Society of America, a Professional Member of the International Conference of Building Officials, a member of the Institute for the Advancement of Engineering, a chartered member of the Consultative Council of the National Institute of Building Sciences, and a founding member of the Los Angeles Tall Buildings Structural Design Council.

As a member of the Structural Engineers’ Association of Southern California (SEAOSC), Pinky served as President in 1971. In 1975, he was selected as President of the Structural Engineers’

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Association of California (SEAOC). He has been a member of the Seismology Committee of SEAOC from 1961 to 1970 and from 1972 to 1974; he was Chair of the Seismology Committee from 1967 to 1970. He was elected an honorary member of SEAOSC in 1984 and was awarded with the S. B. Barnes Award for Research in 1985 and 1990 by SEAOSC.

Pinky has also been very active in the American Concrete Institute (ACI) and is a fellow of ACI. He has served on the Board of Directors and has served on Committee 318 on Building Code requirements, the committee on joints in concrete structures, and the committee on concrete reinforcement. Pinky was awarded the Henry L. Kennedy Award by ACI in 1986.

2. INTERVIEW

Question: How did you get into Structural Engineering?

Pinky: First, I went to school at Berkeley, chose Sanitary Engineering which covered more engineering than any other courses that were there. Didn't have a course on method of least squares. They had one Geodetic Surveying course. Graduated during the war in Sanitary Engineering. Went to graduate school to get my B.S. in Civil Engineering. They gave me a phony one during the war, a Bachelor of Applied Science. One scholarship was offered and because of the war, three out of the four of us got the one scholarship offered because we were actually in graduate school.

My dad was in the L.A. City Building Department. Bob Kadow worked here with Steve Barnes and stopped by to see my dad on business. Bob asked my dad to have me come down to visit S. B. Barnes' office. Before I knew it, I was working at Steve Barnes' office without even knowing what my salary was. Original members of the firm were Bob Kadow, Mark Deering and Steve Barnes.

Question: What did you do when you first came? What was your job?

Pinky: All sorts of things. Everything that came up. The first year I started working on diaphragm tests for Robertson. That kind of testing and analysis is still going on.

Question: Have you pretty much been involved in the testing and the research all the way through?

Pinky: Really to assist people with presentation of research and analysis, to try to help people get their approvals with ICBO, or to provide enough information so the guys reviewing it could follow what occurred.

Question: What three Engineers had the greatest impact on your professional and creative career and what was their impact?

Pinky: Steve Barnes, of course, was the one who was sort of shoving us along. He would get to a certain point and you would ask him a question and if he thought you should figure it out, he would just walk away. He wouldn't tell you the answer so you had to stop and figure it out yourself. Steve had gone to preliminary conferences and had given some sizes to framing members that were based on past experience. When the designer got one size larger than Steve had given initially, he had to work and work to get it down to justify the original preliminary size. Somehow Steve had the idea of how to be able to size members by the feel of it. The rest of them I don't know, there are so many. As far as teachers at school the Professor that I sort of got the most from, indirectly, was Howard Eberhardt at the University of California at Berkeley. During the war, he had lost his leg and so was interested in prosthetics and wasn't too interested in teaching. But he returned to teaching after several years. In the first class after the war, the first question he asked was 'How many people have taken the course before?' Nobody raised his hand. He said 'Good, I haven't taught it before so we are all starting out even. Let's have a quiz.' He was sneaky. Usually all his quizzes were given off of the blackboard. He would write the things out and most of the people would start on the first thing he'd write, which would be a tough one, something you would have to work on a whole hour and not get the answer. I found out very quickly that if you waited to the last one and work on them backwards, the last ones were easy, then you would get all those done but you would still be just as stuck as the other guys were on the first one. But by picking and choosing the easy ones first, you got more credit for the overall quiz. So you had to take a look at what you were doing. He made you work hard on homework, but he never corrected the papers. Of course, we didn't know that until the end of the year.

Question: Then how would he know how to evaluate you?

Pinky: He could tell by discussions in the class what you were doing and by the main midterms, and the final. He just wanted you to go through the homework so that you would be ready for the main exams. Most of the time Eberhardt would answer any questions that might have come up in class. There was one time he sort of looked up at the ceiling after a question was asked, and finally said 'That is one question I can't answer, what's more, nobody can.'

Question: At that time, Pinky, didn't Structural Engineering have just a few courses in it?

Pinky: There were only a few courses in it. Actually the class I was talking about with Eberhardt was unusual in that it was the design of aircraft structures, which I think was a good background for buckling and all the rest of the theoretical material that I have had to get involved in with cold-formed steel. Most Civil Engineering majors didn't take this course.

Question: Well, that's what we are doing now but back then, it was out in 'Never–never land.'

Pinky: That's right. You had enough equations and you followed them and that was it.

Question: Was there a third impact?

Pinky: That would be a tough one. The one that I think I enjoyed the most as far as being well-known was George Winter of Cornell.

Question: He did all the thin gage materials, decking and light gage material, the whole thing.

Pinky: He and I were the only ones who were involved in the three primary design committees: ACI 318, AISC Specification and AISI Cold Formed Specification.

Those are the three Engineers who have contributed most to the overall way I look at structural design. There are so many others, however. I think everybody who gets eager for knowledge will hopefully listen to other people. You may not agree with them, but at least you have their ideas and you are able to use the concepts to make up your mind on the question at hand. If you don't talk to people and get their ideas you are not going to get anywhere.

Question: What are the projects that are most memorable to you?

Pinky: Well, I think the longest job that I had to work on was actually the initial new Los Angeles International (LAX) Airport in 1959–60. It was a whole new airport. The whole airport terminal system. They've added on to the complex since its original construction. It was composed of seven of the current nine Satellite Buildings, Ticketing Buildings (which have been almost doubled in size since the original buildings), the Theme Arch restaurant, the Control Tower, and some service buildings, even though we didn't design the last three. We got somewhat involved in the Theme Restaurant structure because it was a joint venture between our office and Dick Bradshaw's office. He handled the design of the Theme structure, the Control Tower and the service buildings.

The whole airport project was complex. It had six satellite structures, more or less all identical, they had six job captains, and I had to go around and make sure they all came up with essentially the same solution to common problems. And that wasn't easy! I was more or less the Architectural Coordinator, asking 'Why do it this way? Do it like he's doing it.'

Another fairly large job was the Edison Headquarters in Rosemead. It was done around 1970. It was a fairly large building. It was only a four-story building, but it had more floor space and more area than some 30-story buildings we were working on at about the same time.

There were a lot of other unusual structures as well. We did some testing structures for Douglas [Aircraft Company] when they were building the DC-8 [jet airplane]. They had a testing structure to test the fuselage section which was, in a sense, two bird cages on each end of the section of a full-size fuselage. One end was mounted on the ground, the other one was loaded with jacks onto a base structure. In order to do that we had to design the cages to get loads on the perimeter of the fuselage section which is where the actual resistance was. The cages were thoroughly braced for direct and torsional loads. There was one spot in each cage where there were 26 steel members that came together in one point.

It was quite a thing to come up with a drawing. We had one fellow who'd worked for Douglas as their Chief Draftsman in Long Beach. He could do three-dimensional drawings with perspective. So he drew the cages up in three-dimensional perspective. It looked nice, but was way over the steel detailer's head. They couldn't figure out what was going on. In order to help our draftsmen, I sat at home one night and took a coil of wire and made a centerline model of all of the members. Well, the steel detailer came in, saw the model and said, 'I want that.' He took it.

Question: What were your most interesting research projects?

Pinky: Interesting? Well that's sort of ancient history. At one time in Los Angeles, we had separate garbage pickup. Everybody in Los Angeles had to keep a garbage can and a trash can. And they would pick up the garbage with a garbage truck and take it to a local loading area. There the garbage would be put it in a hopper until enough accumulated to sell it to hog farmers out in the valley as silage. A great big massive garbage truck would be brought in and the hopper would be emptied. The work we had to do was to design the transfer station hopper for garbage. If you started looking in all the books for all the angles of repose of garbage, you won't find it. So you have to do something else to develop your design criteria. There were a number of hoppers built around town, so I started going all over the city and finally I got down to one in San Pedro. This hopper was one in which the slope of the hopper was rather shallow in comparison to the others I had seen, I asked the operator if he had any problems with the slope, and I saw right beside the hopper was a wooden paddle. I could see he was probably pushing his way down by hand. He asked, 'What kind of garbage are you talking about?' As this was the first time I heard there were different kinds of garbage, I responded, 'What do you mean? How do you classify them?' He informed me, 'You classify them as hay or slop.' So that's how I found out that in order to design a garbage hopper, the kind of garbage you are going to use has to be specified.

Question: It's been quite useful through your career then?

Pinky: Well, it *is* in the sense that you get a subject that you don't know anything about, and probably nobody else does, but you look around hard and try to find out what is a practical solution. So we got the thing designed and it worked well until the City decided it was not cost effective. They didn't want to have two trucks. Now how many do they have? Three now. They have two trucks and they wanted to get rid of one of the fleets and thought it was too much and it wasn't being paid off by what they got from the farmers. I never did figure out why they really cut it out.

There are a number of things I remember Steve and I had to look into some years ago on large hangers that had a lift door instead of a rolling door. [One of them] had problems because of all the 'guano' that was on top of the thing when it was up. 'Guano', birds come in there . . . bird droppings. You've got to know about the density of bird 'doo.' If you look in the book to find out the dead load of 'guano', you won't find it.

There are always problems that come up in the sense that you have to start thinking about basics and you can't use the norm. You have to do something different. Invariably, if its a logical thing, you should be able to come up with an answer.

Question: Along the lines of basics, where do you think the schools should be going, as far as education?

Pinky: Well, I don't know, I'm very ambivalent on that, in one sense I think that the really important thing in schools is to get a person into the mood of wanting to learn. I don't give a darn what the subject is. And if you *can* get them into the urge of wanting to learn and know things, that's more important than any specific subject *per se*. Because you can always pick it up if you have that urge to read and do things. I know that we had one fellow here who wasn't a good designer at all. But he made a hell of a good professor out at UCLA — in the sense that he just could not do practical things like work out a simple solution to a problem; he always had to go too far into the analysis on the thing for something that he could do just by looking at it. And he just couldn't learn how to do that. But, as far as having an analytical mind, he was good. But he certainly wouldn't make any money for you.

Question: Do you think the training received in school was adequate?

Pinky: Well, I feel the important thing is when you get somebody to continue to be looking at new things and getting new ideas all the way along. Not that they have finished learning while in school. Many feel they know everything, but I'm sure they don't, no matter what you teach them in school.

There are two reasons for me being involved in all of the committees that I am. One is that I don't want to read all the books. I'd just as soon be in there developing some of the provisions and get into the discussion of it and learn it that way, and hear the arguments on one side or the other.

Codes are not simple and straightforward, there's a lot of things left unsaid . . . but I think that is one thing that I've sort of objected to all the way along. I don't think there's any 'holy cows' anywhere in there, and you shouldn't necessarily give up and say that the thing has been there so long that you can't change it.

Question: Do you feel the codes and standards are headed in the right direction?

Pinky: Well I've always been for somehow incorporating the original concepts so that you can involve yourself in what the concept is. The idea of round-off for simplification and so on, and leaving constants in there that you don't know about and all that sort of thing to make it simpler to use I think is wrong. I think a person has to know they can make their own simplifications and the same way on this LRFD. It can get complicated itself but you sure can simplify it down to a single modifier if you want a load and phi factor on certain things, at least the load factors can. And if I'm in a hurry I'll just use a single load factor. It's a little on the conservative side but it makes it a lot simpler. But I feel that you have to go through all of the steps that are in there. If you don't expose the original concepts on things, I think we have a problem. And that's one of the problems of ASD (Allowable Stress Design), there's too much hidden, and some provisions are not rational.

Question: Phi factors and what not?

Pinky: No, unless factors of safety are given, but they're actually variable. That's why the LRFD, at least in concept, is good for research analysis. I guess you more-or-less *have* to do things that way, if you want to work to get more nearly uniform risk. You can simplify the LRFD down for speed and use. *That* should be up to the engineer, rather than using a method blindly. You get a better understanding, and I think that's the direction things going right now on cold-form steel. For instance, in the next addition that will be coming out very shortly, they're going to have a Joint Specification that's going to be both ASD and LRFD in one book.

In other words, you figure resistance on nominal strengths and then you actually apply an omega factor for your factor of safety using ASD, or a phi factor for LRFD. The resistance side of the equation is one thing, regardless of whether you are using ASD or LRFD.

Question: Still has to be based on the tests.

Pinky: Still has to be based on the tests, but that actually helps in the sense of being able to understand when you *d*o run tests what is actually happening — what the variabilities are, how you actually wind up with the uncertainties that you're getting. Another thing I keep pushing is anybody who *does* run tests should do it with LRFD concepts in mind so that they will appropriately take care of the variabilities of the assembly that they are testing.

Question: Well there's a problem right now with some of that they're using it and then getting code approval for something that really hasn't gone far enough, and I think we may be getting to a point where . . . just having a test may not solve the problem.

Pinky: No, it doesn't. And the thing is that you can't use the test in it's own variability alone, that is the whole point of LRFD. You have to analyse all the uncertainties that are outside of the tests as well (such as type of loading, importance of the member, etc.). The type of behavior and whether or not what you are testing is identical to what you are going to use are also important. That's my big gripe on that old Chapter 20 in ACI. It doesn't really do what is intended when testing concrete structures, the new one really doesn't improve it too much. It takes a lot of thought in actually trying to assemble something that's rational in testing.

Question: As far as future designs go, what kind of role do you think high-tech engineering is going to play as far as base isolation, viscous damping, that kind of thing, are concerned in everyday building?

Pinky: Well, I think that they're going to play a part in seismic analysis because it helps to try to understand the basic ideas. I don't think you'll ever get to the point where you don't have to stand back and take a look if the concept is a reasonable solution. Because if you get too involved in numbers *per se*, your assumptions at the start can actually be off. If you don't stand back and look at it, what you're getting out of it could be haywire.

Question: So you think base isolation and viscous damping will be common?

Pinky: It will become more and more common, yes. And I think it's necessary to be able to do that type of thing. At times it's a good solution. Whether it's an economical solution is another point. I still think you have to see if everything is really taken care of by what you've done.

Question: Architects seem to be going along through the years doing less and less trying to dump everything off on whoever, do you think this is going to continue this way?

Pinky: Well that's my concern [relative to] the mechanical engineers more than the architects. I think you have to be worried about the architects in any case. If they were doing it, I would be more afraid of it . . . but the ones I gripe about are the mechanical and electrical people and their general approach on things. Electrical people at times won't even show you anything of what they are going to do in their distribution system until after the building is under construction, and there is nothing on their plans that shows us that. You know, a couple of arrows here and there. I got out to the airport one time and there was a shear wall that was across from a transmission station and they had a bunch of copper ducts coming out of the vault. So what had they done? They put a block hole for the whole width of the wall to get their darn ducts through. Not holes or sleeves, but they actually cut the wall horizontally clear through.

In general they have a discussion or the concept of doing as little design as they can because it is going to change when they contract the material, and that it will be different from that originally shown on the drawings. It sure plays hell with the structural design of the building.

Question: What about the concept of seismic strengthening? You have to beef up the buildings more and more and all you're doing is getting them stiffer and stiffer.

Pinky: I think that's true. I think we need more attention to the detail of what you are doing, and not so much attention necessarily to beefing up in general. In some areas I think strengthening is needed. But I think it is the concept of the whole structure that has been lacking. For instance, in steel design it is slowly going toward that way now, particularly in LRFD. But you do have to take into account the whole building. Concrete is the same way. In the new chapter on analysis that's coming out, it is basically taking the whole structure into account as well as the individual elements.

. . . as long as you don't lose the original concept. One of the things in buckling design to simplify the appearance of the equations has been to eliminate the modulus of elasticity. You know, just throw a number in there that accounts for it. But the designer does not recognize that the number has the modulus of elasticity in it. And now, at least in the cold-form Specification, E has been reinserted into the equations. By incorporation of all constants having units, the designer gets away from the complexity of different systems of units. This will help down the line when things change to use metric units.

Question: Metricated concrete formulas also have some glitches in them too.

Pinky: Yeah, you always have some glitches that arise. The concrete Code metric is a hard metric conversion. It is not created to be a metric equivalent to the inch-pound Code.

Question: Why was it done that way?

Pinky: The idea in conversion was that you were to take a look at a particular number. There might be something in the Code that says twenty feet. What does twenty feet mean? What was the accuracy of the number when it was originally set? Was it plus or minus a foot, plus or minus five feet? To perform a hard conversion you have to go back to the original thinking and come up with an appropriate metric value. If a soft conversion were made, the numbers imply a much greater accuracy than was originally intended. If you do go to the hard conversion, that means you have to totally ignore what you have, and come up with something new that would fit those same parameters that you started out with or they were originally set at, and come up with a new one with the same degree of accuracy. That could produce something slightly different. All the way through the whole concrete Code that process was done; with every formula we essentially went back to what was the original concept. And from that, we would then make an appropriate round-off.

The calculations and drawings are to be done in metric units. Certain Federal departments don't have the requirements in effect. There are some that aren't going to be effective until '96. There are others that have been in since '94. All of them are supposed to be using metric by the end of '96. It can be quite a problem. In fact, they are just now having the big battle on the metric rebar. One of the things that happened was that Canada came up with metric bar sizes that would actually save the number of bar sizes that had to be made. So they came up with the sizes and eliminated three bar sizes. And, in a sense, that's what metrication in ACI 318 went along with. The problem is that instead of actually eliminating three sizes in the interim period when you are supplying both metric and inch-pound bars, you have to stock 11 bars plus 8 bars, or 19 sizes. I think there are a number of transportation departments throughout the country, particularly in Texas, that worked up their whole set of regulations for design based on the metric sizes, and then somebody in CRSI had a push from a lot of people to create a soft conversion by having the bars the same as they currently are with 11 sizes. In other words, have the metric change to a soft conversion. And transportation departments all over the country . . . . had all these publications out using those other bar sizes. Now we are going to have to change it all. Well, arguments have been going on over that subject for about 2 or 3 years now. I just received the other day a whole new set of proposed standards which are soft-conversion sizes.

What they did was throw out the number 4 and the . . . I think it was the number 8, and move the others a little bit closer. Anyway, they came down to 8 sizes instead of 11. That took a lot of argument, which I guess has finally settled down.

Question: Currently are there practitioners on code writing committees?

Pinky: I think more people have to get involved on a national scale [code committees]. I'm (eventually) going to be dropping out, like I dropped out of ACI, I haven't as yet on the others, but I assume eventually I will. Some Southern California Engineer should get involved and take them up. But there needs to be a consciousness of what is being done on a national scale. And there are some people involved on the BSSC system, of course, particularly up north but not so much down here in Southern California.

Only a little less than one-third of committee members are from academia. But there are prominant people in some of those committees. For instance it was George Winter, now it's Teomon Pakos on cold-form, along with WeWen Yu in Missouri. Those two are sort of specialists in that area, and you are going to have a few people competing on it. You do have some new ones and some young ones that are coming up. Young fellows in academia. But there are some of the people in academia who because of their particular interest in the area, I'm thinking in the terms of vibration and that sort of thing, there are few in practice that know anything about it. That is all academic. And they have to solve real problems because they are the only ones available. Most of the committees, particularly ACI, are 1/3 industry, 1/3 practitioners and 1/3 academic. It's the same way with AISC. There are some members of committees that are quite dominating people. There are quite a number of committees that have practitioners in there. Unfortunately, not many of them are from Southern California, that's my concern. That's why I've been stuck on so many of them.

Question: How are we going to train the young engineers? That's the question.

Pinky: I think the main thing is we have to have someone who is interested in learning to start with. If you are talking about training someone who is not interested, then I would say forget him or her. Some people we've had really should not have been in the engineering business at all. They didn't last very long. But, I think the main thing is not to give up and try to solve all their problems for them. Try to guide them into the proper way of thinking, that's the hardest thing. Senior engineers should stop what they are doing and try to help out the younger ones on thinking. Not necessarily with the solution of what he or she is trying to do, but how does he or she think out the problem.

Question: It is difficult because you don't even realize how you think it out sometimes.

Pinky: Yeah, I know, you have your own way of doing it. But you have to get them to go through the thought process. It's the hardest thing in the world for me to take some of these fellows, like we have a fellow from Japan upstairs, and I make him write letters in response to the problems that he has been solving. It's hard . . . and it's like pulling teeth. But its the only way he is going to be able to learn is to write the letters and respond to the particular problem that he had, rather than doing it yourself. It's an easy enough thing to take it yourself and do it.

Question: That's the problem when there is a crush, you can do it several times faster, but should you?

Pinky: But I think you have to somehow find the time to be able to get them to actually perform those tasks.